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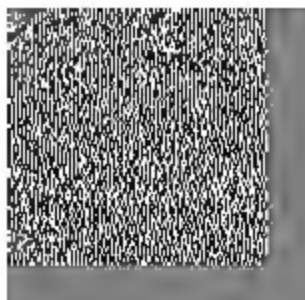
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**FROM THE
UNITED STATES GOVERNMENT**

U.S. - Hydrographic office

H. O. No. 105

AFRICA PILOT

Volume I

1916

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SECRETARY OF THE NAVY



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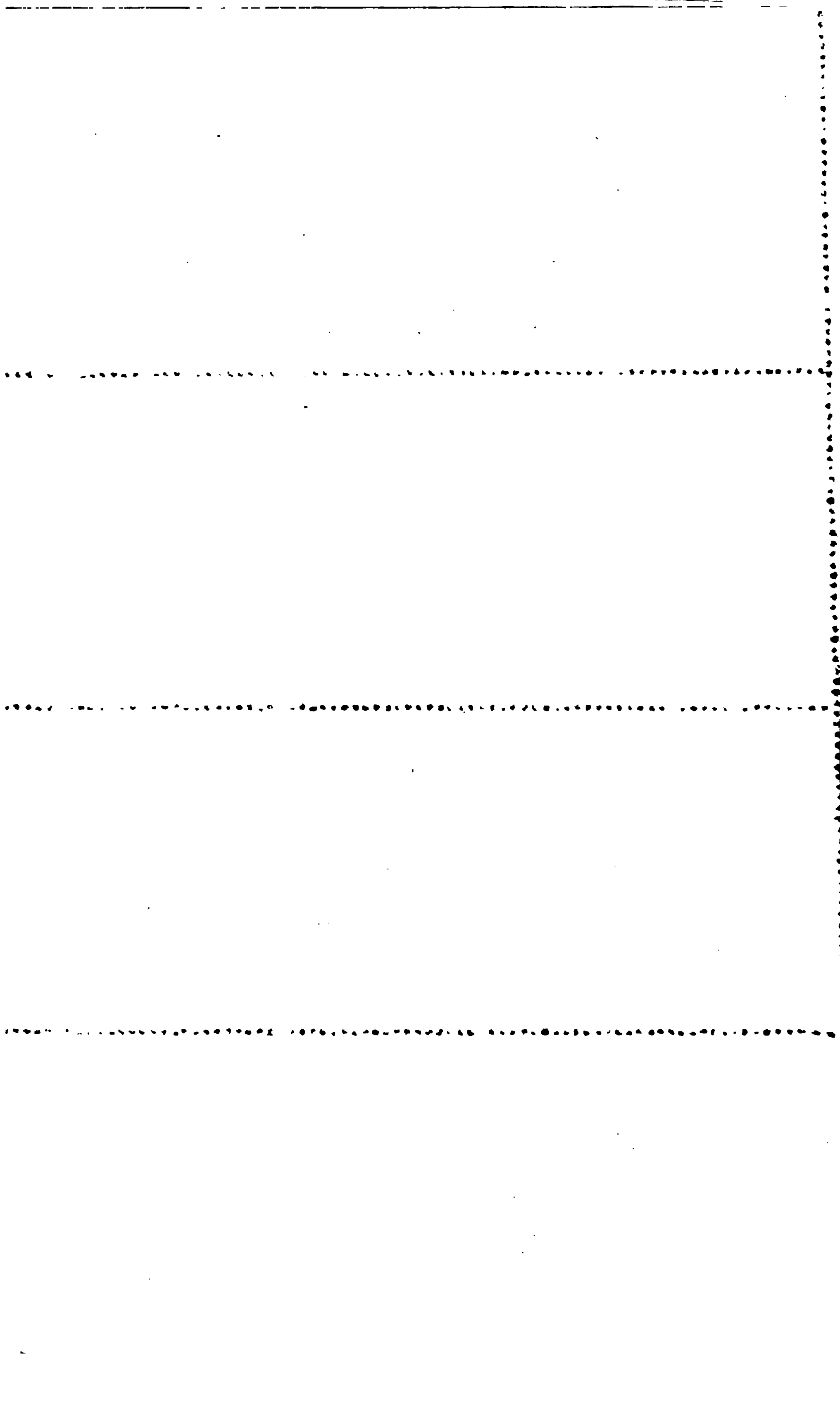
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P R E F A C E .

This publication comprises the sailing directions of the southwest coast of Africa from Cape Palmas to the Cape of Good Hope, including the islands of St. Helena, Ascension, Tristan da Cunha, and neighboring islands. It cancels all Notices to Mariners up to and including No. 38 of 1916.

The information contained in this work has been compiled principally from H. O. Publication No. 105, West Coast of Africa, 1908, which it cancels, and Africa Pilot, Part II, 1910, published by the British Admiralty. It contains much information derived from the reports of consular, naval, and merchant marine officers furnished to this office.

The remarks concerning communications apply to conditions as they were before the European war.

The bearings and courses are true and are given in degrees, from 0° to 360° (clockwise).

Bearings limiting sectors of lights are toward the light.

The directions of winds refer to the points from which they blow; of currents, the points toward which they set. These directions are *true*.

Variations, with the annual rate of change, may be obtained from H. O. chart No. 2406, Variation of the Compass.

Distances are expressed in nautical miles, the mile being approximately 2,000 yards.

Soundings are referred to ordinary springs low water.

Heights are referred to mean high water.

The latest information regarding lights, their characteristics, sectors, fogsignals, and submarine bells should always be sought in the light lists.

Attention is invited to the coupons on the first page of this book, which entitle the purchaser to a summary of the Notices to Mariners affecting this publication. They will be ready for distribution as soon as practicable after the first of each year, beginning January, 1918.

Mariners are requested to notify the United States Hydrographic Office, directly or through one of its branch offices, of any new information obtained, or of any errors or omissions discovered in this publication.

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INFORMATION RELATING TO NAVIGATIONAL AIDS AND GENERAL NAVIGATION.

THE CORRECTION OF CHARTS, LIGHT LISTS, AND SAILING DIRECTIONS.

The following publications are issued by the United States Hydrographic Office as guides to navigation: Charts, Chart Catalogues, Sailing Directions, Light Lists, Tide Tables, Notices to Mariners, Pilot Charts, and Hydrographic Bulletins. Of these, the Notices to Mariners and the Hydrographic Bulletins are free to mariners and others interested in shipping. The Pilot Charts are free to contributors of professional information, but are sold to the general public at 10 cents a copy. The other publications of the office are sold under the law at cost price.

The Charts, the Sailing Directions, and the Light Lists are all affected by continual changes and alterations, concerning which information from all parts of the world is published weekly in the Notices to Mariners.

The charts are always corrected for all available information up to the date of issue stamped upon them; and the Light Lists should be noted for the recent alterations and additions. The Sailing Directions, however, can not, from their nature, be so fully corrected, and in all cases where they differ from the charts, the charts must be taken as the guide.

Charts.—When issued from the Hydrographic Office, the charts have received all necessary corrections to date.

All small but important corrections that can be made by hand are given in the Notices to Mariners, and should at once be placed on the charts to which they refer.

Extensive corrections that can not be conveniently thus made are put upon the plates, and new copies are put on sale. Masters of vessels are urged to replace the old charts, which should be destroyed to prevent the possibility of their being used in the navigation of the ship.

The dates on which extensive corrections are made are noted on the chart on the right of the middle of the lower edge; those of the smaller corrections at the left lower corners.

The edition, and corresponding date, of the chart will be found in the right lower corner, outside the outer neat line.

In all cases of quotations of charts, these dates of corrections should be given, as well as the number of the chart (found in the lower right and upper left corners), in order that the edition of the chart referred to may be known.

The Light Lists are corrected before issue, and all changes are published in the weekly Notices to Mariners.

The navigating officer should make notations in the tabular form in the Light Lists and paste in at the appropriate places slips from the Notices to Mariners.

The Light Lists should always be consulted as to the details of a light, as the description in the sailing directions is not complete, and may be obsolete, in consequence of changes since publication.

The Sailing Directions or Pilots are kept corrected by addenda; and subsequent to date of last addenda, they should be kept corrected by means of the Notices to Mariners. Sailing Directions issued to naval vessels carry with them an envelope containing slips of corrections up to date of issue.

Addenda are published from time to time, and contain a summary of all the information received up to date since the publication of the volume to which they refer, canceling all previous Notices to Mariners.

To enable the books to be more conveniently corrected, addenda and Notices to Mariners are printed on one side only, and two copies of the latter are issued to each naval vessel, one to be cut and the slips pasted in at the appropriate places, the other to be retained intact for reference.

To paste in the slips, as the Notices to Mariners are received, is one of the duties of the navigating officer, demanding faithful attention.

It must, however, be understood that Sailing Directions will rarely be correct in all details, and that, as already stated, when differences exist, the chart, which should be corrected from the most recent information, should be taken as the guide, for which purpose, for ordinary navigation, it is sufficient.

The Tide Tables, which are published annually by the United States Coast and Geodetic Survey, give the predicted times and heights of the high and the low waters for every day in the year at 70 of the principal ports of the world, and, through the medium of these by means of tidal differences and ratios, at a very large number of subordinate ports. The tables for the Atlantic and the Pacific coast ports of the United States are also published separately.

It should be remembered that these tables aim to give the times of high and low water, and not the times of turning of the current or of slack water, which may be quite different.

Notices to Mariners, containing fresh information pertaining to all parts of the world, are published weekly and mailed to all

United States ships in commission, Branch Hydrographic offices and agencies, and United States consulates. Copies are furnished free by the main office or by any of the branch offices on application.

With each Notice to naval vessels is sent also a separate sheet, giving the items relating to lights contained in the latest Notice, intended especially for use in correcting the Light Lists.

Pilot Charts of the North Atlantic, Central American Waters, and North Pacific and Indian Oceans are published each month, and of the South Atlantic and South Pacific Oceans each quarter. These charts give the average conditions of wind and weather, barometer, percentage of fog and gales, routes for steam and sailing vessels for the period of issue, ice and derelicts for the preceding period, ocean currents and magnetic variation for the current year, storm tracks for preceding years, and much other useful information. They are furnished free only in exchange for marine data or observations.

Hydrographic Bulletins, published weekly, are supplemental to the Pilot Charts, and contain the latest reports of obstructions and dangers along the coast and principal ocean routes, ice, derelicts, and wreckage, reports of the use of oil to calm the sea, and other information for mariners. They are to be had free upon application.

THE USE OF CHARTS.

Accuracy of chart.—The value of a chart must manifestly depend upon the character and accuracy of the survey on which it is based, and the larger the scale of the chart the more important do these become.

To judge of a survey, its source and date, which are generally given in the title, are a good guide. Besides the changes that may have taken place since the date of the survey, in waters where sand or mud prevails, the earlier surveys were mostly made under circumstances that precluded great accuracy of detail; until a chart founded on such a survey is tested, it should be regarded with caution. It may, indeed, be said that, except in well-frequented harbors and their approaches, no surveys yet made have been so thorough as to make it certain that all dangers have been found. The number of the soundings is another method of estimating the completeness of the survey, remembering, however, that the chart is not expected to show all the soundings that were obtained. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

Large or irregular blank spaces among soundings mean that no soundings were obtained in these spots. When the surrounding soundings are deep it may fairly be assumed that in the blanks the water is also deep; but when they are shallow, or it can be

seen from the rest of the chart that reefs or banks are present, such blanks should be regarded with suspicion. This is especially the case in coral regions and off rocky coasts, and it should be remembered that in waters where rocks abound it is always possible that a survey, however complete and detailed, may have failed to find every small patch or pinnacle rock.

A wide berth should therefore be given to every rocky shore or patch, and instead of considering a coast to be clear, the contrary should be assumed.

Fathom curves a caution.—Except in charts of harbors that have been surveyed in detail, the 5-fathom curve on most charts may be considered as a danger line or caution against unnecessarily approaching the shore or bank within that line, on account of the possible existence of undiscovered inequalities of the bottom, which only an elaborate detailed survey could reveal. In general surveys of coasts or of little frequented anchorages, the necessities of navigation do not demand the great expenditure of time required for so detailed a survey. It is not contemplated that ships will approach the shores in such localities without taking special precautions.

The 10-fathom curve on rocky shores is another warning, especially for ships of heavy draft.

A useful danger curve will be obtained by tracing out with a colored pencil, or ink, the line of depth next greater than the draft of the ship using the chart. For vessels drawing less than 18 feet the edge of the sanding serves as a well-marked danger line.

Charts on which no fathom curves are marked must especially be regarded with caution, as indicating that soundings were too scanty and the bottom too uneven to enable the curves to be drawn with accuracy.

Isolated soundings, shoaler than surrounding depths, should always be avoided, especially if ringed around, as it is doubtful how closely the spot may have been examined and whether the least depth has been found.

The chart on largest scale should always be used on account of its greater detail and the greater accuracy with which positions may be plotted on it.

Caution in using small-scale charts.—In approaching the land or dangerous banks, regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large-scale chart, whereas on one of small scale the same amount of displacement means a large fraction of a mile.

Distortion of printed charts.—The paper on which charts are printed from engraved plates has to be damped. On drying distortion takes place from the inequalities of the paper, which greatly

varies with different papers and the amount of the damping; but it does not affect navigation. The larger the chart the greater the amount of this distortion. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree when carefully plotted on the chart, especially if the lines to objects be long.

Mercator chart.—Observed bearings are not identical with those measured on the Mercator chart (excepting only the bearings north and south, and east and west on the equator) because the line of sight, except as affected by refraction, is a straight line and lies in the plane of the great circle, while the straight line on the chart (except the meridian line) represents, not the arc of a great circle, but the loxodromic curve, or rhumb line, which on the globe is a spiral approaching but never in theory reaching the pole, or, if the direction be east and west, a circle of latitude.

The difference is not appreciable with near objects, and in ordinary navigation may be neglected. But in high latitudes, when the objects are very distant and especially when lying near east or west, the bearings must be corrected for the convergence of the meridians in order to be accurately placed on the Mercator chart, which represents the meridians as parallel.

On the polyconic chart, since a straight line represents (within the limits of 15 or 20 degrees of longitude) the arc of a great circle or the shortest distance between two points, bearings of the chart are identical with observed bearings.

The mercator projection is unsuited to surveying, for which purpose the polyconic projection is used by the Hydrographic Office and the Coast and Geodetic Survey.

Notes on charts should always be read with care, as they may give important information that can not be graphically represented.

Buoys.—Too much reliance should not be placed on buoys always maintaining their exact positions. They should therefore be regarded as warnings, and not as infallible navigational marks, especially when in exposed places and in the wintertime; and a ship's position should always, when possible, be checked by bearings or angles of fixed objects on shore.

Gas buoys.—The lights shown by gas buoys can not be implicitly relied on; the light may be altogether extinguished, or, if periodic, the apparatus may get out of order.

Whistle and bell buoys are sounded only by the action of the sea; therefore, in calm weather, they are less effective or may not sound.

Lights.—All the distances given in the Light Lists and on the charts for the visibility of lights are calculated for a height of 15 feet for the observer's eye. The effect of a greater or less height

of eye can be ascertained by means of the table of distances of visibility due to height, published in the Light Lists.

The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Refraction, too, may often cause a light to be seen farther than under ordinary circumstances.

When looking out for a light, the fact may be forgotten that aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be obtained from the standard compass when you lay down from aloft.

On first making a light from the bridge, by at once lowering the eye several feet and noting whether the light is made to dip, it may be determined whether the ship is on the circle of visibility corresponding with the usual height of the eye, or unexpectedly nearer the light.

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen.

The power of a light can be estimated by its candlepower or order, as stated in the Light Lists, and in some cases by noting how much its visibility in clear weather falls short of the range corresponding to its height. Thus, a light standing 200 feet above the sea and recorded as visible only 10 miles in clear weather, is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles if of sufficient power.

Fog signals.—Sound is conveyed in a very capricious way through the atmosphere. Apart from the influence of the wind large areas of silence have been found in different directions and at different distances from the origin of sound, even in clear weather; therefore, too much confidence should not be felt as to hearing a fog signal. The apparatus, moreover, for sounding the signal often requires some time before it is in readiness to act. A fog often creeps imperceptibly toward the land, and may not be observed by the lighthouse keepers until upon them; a ship may have been for many hours in it, and approaching the land in confidence, depending on the signal, which is not sounded. When sound travels against the wind, it may be thrown upward; a man aloft might then hear it though inaudible on deck.

The submarine bell system of fog signals is much more reliable than systems transmitting sound through the air, as sound traveling in water is not subject to the same disturbing influences; the fallibility of the lighthouse keeper is, however, about the same in all systems, so that caution should be observed even by vessels equipped with submarine-bell receiving apparatus.

Submarine bells have an effective range of audibility greater than signals sounded in air, and a vessel equipped with receiving apparatus may determine the approximate bearing of the signal. These signals may be heard also on vessels not equipped with receiving apparatus by observers below the water line, but the bearing of the signal can not then be readily determined.

Vessels equipped with radio apparatus and submarine bell receivers may fix their distance from a light vessel having radio and submarine bell, utilizing the difference in velocity of sound waves of the radio and the bell. Sound travels 4,794 feet per second at 66° F. in water, and the travel of radio sound waves for practicable distances may be taken as instantaneous.

All vessels should observe the utmost caution in closing the land in fogs. The lead is the safest guide and should be faithfully used.

Tides.—A knowledge of the times of high and low water and of the amount of vertical rise and fall of the tide is of great importance in the case of vessels entering or leaving port, especially when the low water is less than or near their draft. Such knowledge is also useful at times to vessels running close along a coast, in enabling them to anticipate the effect of the tidal currents in setting them on or offshore. This is especially important in fog or thick weather.

The predicted times and heights of the high and low waters, or differences by which they may be readily obtained, are given in the Tide Tables for all the important ports of the world. The height at any intermediate time may be obtained by means of Tables 2A and 2B for most of the principal tidal stations of the United States, given in Table 1, and for the subordinate stations of Table 3 by using them as directed in the Tide Tables. The intermediate height may also be obtained by plotting the predicted times and heights of high and low water and connecting the points by a curve. Such knowledge is often useful in crossing a bar or shallow flats.

Planes of reference.¹—The plane of reference for soundings on Hydrographic Office charts made from United States Government surveys and on Coast and Geodetic Survey charts of the Atlantic coast of the United States is mean low water; on the Pacific coast of the United States as far as the Strait of Juan Fuca, it is the mean of the lower low waters; and from Puget Sound to Alaska, the plane employed on Hydrographic Office charts is low water ordinary springs.

On most of the British Admiralty charts the plane of reference is the low water of ordinary springs; on French charts, the low water of equinoctial springs.

¹ The distinction between "rise" and "range" of the tide should be understood. The former expression refers to the height attained above the datum plane for soundings, differing with the different planes of reference; the latter, to the difference of level between successive high and low waters.

In the case of many charts compiled from old or various sources the plane of reference may be in doubt. In such cases, or when ever not stated on the chart, the assumption that the reference plane is low water ordinary springs gives a larger margin of safety than mean low water.

Whichever plane of reference may be used for a chart it must be remembered that there are times when the tide falls below it. Low water is lower than mean low water about half the time, and when a new or full moon occurs at perigee the low water is lower than the average low water of springs. At the equinoxes the spring range is also increased on the coasts of Europe, but in some other parts of the world, and especially in the Tropics, such periodic low tides may coincide more frequently with the solstices.

Wind or a high barometer may at times cause the water to fall below even a very low plane of reference.

On coasts where there is much diurnal inequality in the tides, the amount of rise and fall can not be depended upon and additional caution is necessary.

Mean sea level.—The important fact should be remembered that the depths at half tide are practically the same for all tides, whether neaps or springs. Half tide therefore corresponds with mean sea level. This makes a very exact plane of reference, easily found, to which it would be well to refer all high and low waters.

The Tide Tables give in Table 3, for all the ports, the plane of reference to which tidal heights are referred and its distance below mean sea level.

If called on to take special soundings for the chart at a place where there is no tidal bench mark, mean sea level should be found and the plane for reductions established at the proper distance below it, as ascertained by the Tide Tables, or by observations, or in some cases, if the time be short, by estimation, the data used being made a part of the record.

Tidal streams.—In navigating coasts where the tidal range is considerable, especial caution is necessary. It should be remembered that there are indrafts to all bays and bights, although the general run of the stream may be parallel with the shore.

The turn of the tidal stream offshore is seldom coincident with the times of high and low water on the shore. In some channels the tidal stream may overrun the turn of the vertical movement of the tide by three hours, forming what is usually known as tide and half tide, the effect of which is that at high and low water by the shore the stream is running at its greatest velocity.

The effect of the tidal wave in causing currents may be illustrated by two simple cases.

(1) Where there is a small tidal basin connected with the sea by a large opening.

(2) Where there is a large tidal basin connected with the sea by a small opening.

In the first case the velocity of the current in the opening will have its maximum value when the height of the tide within is changing most rapidly, i. e., at a time about midway between high and low water. The water in the basin keeps at approximately the same level as the water outside. The flood stream corresponds with the rising and the ebb with the falling of the tide.

In the second case the velocity of the current in the opening will have its maximum value when it is high water or low water without, for then there is the greatest head of water for producing motion. The flood stream begins about three hours after low water, and the ebb stream about three hours after high water, slack water thus occurring about midway between the tides.

Along most shores not much affected by bays, tidal rivers, etc., the current usually turns soon after high water and low water.

The swiftest current in straight portions of tidal rivers is usually in the middle of the stream, but in curved portions the most rapid current is toward the outer edge of the curve, and here the water will be deepest. The pilot rule for best water is to follow the ebb tide reaches.

Countercurrents and eddies may occur near the shores of straits, especially in bights and near points. A knowledge of them is useful in order that they may be taken advantage of or avoided.

A swift current often occurs in a narrow passage connecting two large bodies of water, owing to their considerable difference of level at the same instant. The several passages between Vineyard Sound and Buzzards Bay are cases in point. In the Woods Hole passage the maximum strength of the tidal streams is at about half tide.

Tide rips are made by a rapid current setting over an irregular bottom, as at the edges of banks where the change of depth is considerable.

Current arrows on charts show only the most usual or the mean direction of a tidal stream or current; it must not be assumed that the direction of a stream will not vary from that indicated by the arrow. The rate, also, of a stream constantly varies with circumstances, and the rate given on the chart is merely the mean of those found during the survey, possibly from very few observations.

FIXING POSITION.

Sextant method.—The most accurate method available to the navigator of fixing a position relative to the shore is by plotting with a protractor, sextant angles between three well-defined objects on

shore which are shown on the chart; this method, based on the "three-point problem" of geometry, should be in general use.

For its successful employment it is necessary: First, that the objects be well chosen; and, second, that the observer be skillful and rapid in his use of the sextant. The latter is only a matter of practice. Two observers are better for this method.

Near objects should be used either for bearings or angles for position in preference to distant ones, although the latter may be more prominent, as a small error in the bearing or angle or in laying it on the chart has a greater effect in misplacing the position the longer the line to be drawn.

On the other hand distant objects should be used for direction, because less affected by a small error or change of position.

The three-arm protractor or station pointer consists of a graduated brass circle with one fixed and two movable radial arms, the three beveled edges of the arms, if produced, intersecting at the exact center of the instrument. The edge of the fixed arm marks the zero of the graduation which enables the movable arms to be set at any angles with the fixed arm.

To plot a position, the two angles observed between the three selected objects are set on the instrument, which is then moved over the chart until the three beveled edges pass respectively and simultaneously through the three objects. The center of the instrument will then mark the ship's position, which may be pricked on the chart or marked with a pencil point through the center hole.

The transparent xylonite protractor is an excellent substitute for the brass instrument and in some cases preferable to it, as when, for instance, the objects angled on are so near the observer that they are more or less hidden by the circle of the instrument. The xylonite protractor also permits the laying down for simultaneous trial of a number of angles in cases of fixing important positions. Plain tracing paper may also be used if there are any suitable means of laying off the angles.

The value of a determination depends greatly on the relative positions of the objects observed. If the position sought lies on the circle passing through three objects (in which case the sum of the observed angles equals the supplement of the angle at the middle object made by lines from the other two) it will be indeterminate, as it will plot all around the circle. Such an observation is called a "revolver." An approach to this condition must be avoided. Near objects are better than distant ones, and, in general, up to 90° the larger the angles the better, remembering always that large as well as small angles may plot on or near the circle and hence be worthless. If the objects are well situated, even very small angles will give for

navigating purposes a fair position, when that obtained by bearings of the same objects would be of little value.

Accuracy requires that the two angles be simultaneous. If under way and there is but one observer the angle that changes less rapidly may be observed both before and after the other angle and the proper value obtained by interpolation.

A single angle and a range of two objects give in general an excellent fix, easily obtained and plotted.

Advantages of sextant method.—In many narrow waters where the objects may yet be at some distance, as in coral harbors or narrow passages among mud banks, navigation by sextant and protractor is invaluable, as a true position can in general be obtained only by its means. Positions by bearings are too rough to depend upon, and a small error in either taking or plotting a bearing might under such circumstances put the ship ashore.

In all cases where great accuracy of position is desired, such as the fixing of a rock or shoal, or of fresh soundings or new buildings as additions to the chart, the sextant should invariably be used. In all such cases angles should be taken to several objects, the more the better; but five objects is a good number, as the four angles thus obtained not only prevent any errors, but they at once furnish a means of checking the accuracy of the chart itself. If a round of angles can be taken the observer's accuracy is also checked. In the case of ordinary soundings a third angle need be taken only occasionally; first, to check the general accuracy of the chart, as above stated; second, to make certain that the more important soundings, as at the end of a line, are correctly placed.

If communication can be had with the shore, positions may be fixed with great accuracy by occupying with theodolite or sextant two known points of the chart. The third angle of the triangle, that between the two points at the position sought, should be measured as a check.

The compass.—It is not intended that the use of the compass to fix the ship should be given up; in ordinary piloting the compass, with its companion, the pelorus, may be usefully employed for this purpose, although less accurate than the sextant.

If the accuracy of the chart is doubtful, the compass should be used in preference to the sextant.

In fixing by the compass, it should always be remembered that a position by two bearings only, like that by two angles only, is liable to error. An error may be made in taking a bearing, or in applying to it the deviation, or in laying it on the chart. A third or check bearing should, therefore, be taken of some other object, especially when near the shore or dangers. A common intersection for the three lines assures accuracy.

When the three lines do not intersect in a point, the following rule holds: If the line drawn to the middle object falls to the right of the point of intersection of the lines to the two outside objects, the position of the observer was to the right of the line to the middle object; and if it falls to the left of the intersection his position was to the left of the line. Thus it will be seen that the assumption, that the position is at the center of the triangle formed by the intersecting lines, is incorrect.

Doubling the angle on the bow.—The method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "bow and beam bearing," the distance from the object at the latter position being the distance run between the times of taking the two bearings, gives the maximum of accuracy, and is an excellent fix for a departure, but does not insure safety, as the object observed and any dangers off it are abeam before the position is obtained.

By taking the bearings at two points and four points on the bow, a fair position is obtained before the object is passed, the distance of the latter at the second position being, as before, equal to the distance run in the interval, allowing for current. Taking afterwards the beam bearing gives, with slight additional trouble, the distance of the object when abeam; such beam bearings and distances, with the times, should be continuously recorded as fresh departures, the importance of which will be appreciated in cases of being suddenly shut in by fog.

When the first bearing is $26\frac{1}{2}^{\circ}$ from ahead, and the second 45° , the run between bearings will equal the distance at which the object will be passed abeam.

A table of multipliers of the distance run in the interval between any two bearings of an object, the product being its distance at the time of the second bearing, is given in the Light Lists and in Bowditch.

Danger angle.—The utility of the danger angle in passing outlying rocks or dangers should not be forgotten. In employing the horizontal danger angle, however, caution is necessary, as should the chart be inaccurate, i. e., should the objects selected be not quite correctly placed, the angle taken off from it may not serve the purpose. It should not, therefore, be employed when the survey is old or manifestly imperfect.

The vertical danger angle may be conveniently used when passing elevated points of known heights, such as lighthouses, cliffs, etc. The computation of the distance corresponding to the height of the object and its angular elevation requires for small distances merely the solution of a plain right triangle; the natural cotangent of the angle multiplied by the height in feet gives the distance in

feet. The convenient use of this method, however, requires tables such as those published by Capt. Lecky in his little book entitled "The Danger Angle and Offshore Distance Tables." This book very usefully extends the vertical angle method to finding a ship's position at sea by observing the angular altitude of a peak of known height and its bearing. The tables give heights up to 18,000 feet and distances up to 110 miles.

When the angles are not too large they should be observed "on and off the limb" and the index error of the sextant thus eliminated, in preference to correcting for it the single altitude. It must be remembered that in high latitudes the bearing of a distant object needs correction for the convergence of the meridians before being laid down on a Mercator chart. The correction may be found by the following formula, using the approximate position: The sine of the correction equals the product of the sine of half the difference of longitude by the sine of the middle latitude. It is applied on the equatorial side of the observed bearing and its effect is always to increase the latitude of the observer.

Soundings taken at random are of little value in fixing or checking position and may at times be misleading. In thick weather, when near or closing the land, soundings should be taken continuously and at regular intervals, and, with the character of the bottom, systematically recorded. By laying the soundings on tracing paper, according to the scale of the chart, along a line representing the track of the ship, and then moving the paper over the chart, keeping the line representing the track parallel with the course until the observed soundings agree with those of the chart, the ship's position will in general be quite well determined. This plan was suggested by Lord Kelvin, whose admirable sounding machine renders the operation of sounding possible in quite deep water, without slowing down the ship and consequent loss of time.

Pelorus.—All ships should be supplied with the means of taking accurate bearings both by night and by day. The standard compass is not always conveniently placed for the purpose; in such case a pelorus will be very useful, but the results are not as accurate as those obtained direct from the compass. The utility of such an instrument in ascertaining the change of bearing of an approaching ship should not be overlooked.

Position lines.—Among the various methods of fixing position at sea, the one which should be best understood and put to the most constant use is that employing position or Sumner lines. These lines give the most comprehensive information to the navigator with the least expenditure of labor and time. The knowledge gained is that the vessel must be somewhere on the line, provided the data used is accurate and the chronometer correct. As the information

given by one line of position is not sufficient to determine the definite location of the vessel, it is necessary to cross this line by another similarly obtained, and the vessel being somewhere on both must be at their intersection. However, a single line, at times, will furnish the mariner with invaluable information; for instance, if it is directed toward the coast, it marks the bearing of a definite point on the shore, or if parallel to the coast it clearly indicates the distance off, and so will often be found useful as a course. A sounding taken at the same time with the observation will in certain conditions prove of great value in giving an approximate position on the line.

The easiest and quickest way to establish a line of position is by employing the method of Marcq St. Hilaire, as modified by the use of tables of altitude. The principle of this method is one of altitude differences, in which the observed altitude is compared with the computed altitude for a dead reckoning, or other selected position, and the difference in minutes of latitude measured toward the body along the line of its azimuth, if the observed altitude is greater than the computed altitude, and vice versa. A line drawn at right angles to the line of azimuth through the point thus determined is the position line, somewhere upon which will be found the position of the vessel. The tables of altitude obviate the computation of the altitude and thereby greatly facilitate the establishment of the line.

A position line may also be found by computing two positions for longitude with two assumed latitudes, and drawing the line between them; or by drawing to the position obtained with one latitude a line at right angles to the bearing of the body as taken from the azimuth tables.

A very accurate position can be obtained by observing two or more stars at morning or evening twilight, at which time the horizon is well defined. The position lines thus obtained will, if the bearings of the stars differ three points or more, give an excellent result. A star or planet at twilight and the sun afterwards or before may be combined; also two observations of the sun with sufficient interval to admit of a considerable change of bearing. In these cases one of the lines must be moved for the run of the ship. The moon is often visible during the day and in combination with the sun gives an excellent fix.

The morning and evening twilight observations, besides their great accuracy, possess the additional advantage of greatly extending the ship's reliable reckoning beyond the limits of the ordinary day navigation, and correspondingly restricting the dead reckoning uncertainties of the night. An early morning fix in particular is often of great value. Though the same degree of

accuracy as at twilight can not be expected, night observations are very valuable and should be assiduously practiced.

Piloting.—The navigator, in making his plan for entering a strange port, should give very careful previous study to the chart and sailing directions, and should select what appear to be the most suitable marks for use, also providing himself with substitutes to use in case those selected as most suitable should prove unreliable in not being recognized with absolute certainty. Channel buoys seen from a distance are difficult to identify, because their color is sometimes not easily distinguished and they may appear equally distant from the observer even though they be at widely varying distances. Ranges should be noted, if possible, and the lines drawn, both for leading through the best water in channels, and also for guarding against particular dangers; for the latter purpose safety bearings should in all cases be laid down where no suitable ranges appear to offer. The courses to be steered in entering should also be laid down and distances marked thereon. If intending to use the sextant and danger angle in passing dangers, and especially in passing between dangers, the danger circles should be plotted and regular courses planned, rather than to run haphazard by the indications of the angle alone, with the possible trouble from bad steering at critical points.

The ship's position should not be allowed to be in doubt at any time, even in entering ports considered safe and easy of access, and should be constantly checked, continuing to use for this purpose those marks concerning which there can be no doubt until others are unmistakably identified.

The ship should ordinarily steer exact courses and follow an exact line, as planned from the chart, changing course at precise points, and, where the distances are considerable, her position on the line should be checked at frequent intervals. This is desirable even where it may seem unnecessary for safety, because if running by the eye alone and the ship's exact position be immediately required, as in a sudden fog or squall, fixing at that particular moment may be attended with difficulty.

The habit of running exact courses with precise changes of course will be found most useful when it is desired to enter port or pass through inclosed waters during fog by means of the buoys; here safety demands that the buoys be made successively, to do which requires, if the fog be dense, very accurate courses and careful attention to the times, the speed of the ship, and the set of the current; failure to make a buoy as expected leaves, as a rule, no safe alternative but to anchor at once, with perhaps a consequent serious loss of time.

In passing between dangers where there are no suitable leading marks, as, for instance, between two islands or an island and the main shore, with dangers extending from both, a mid-channel course may be steered by the eye alone with great accuracy, as the eye is able to estimate very closely the direction midway between visible objects.

In piloting among coral reefs or banks, a time should be chosen when the sun will be astern, conning the vessel from aloft or from an elevated position forward. The line of demarcation between the deep water and the edges of the shoals, which generally show as green patches, is indicated with surprising clearness. This method is of frequent application in the numerous passages of the Florida Keys.

Changes of course should in general be made by exact amounts, naming the new course or the amount of the change desired, rather than by ordering the helm to be put over and then steadying when on the desired heading, with the possibility of the attention being diverted and so of forgetting in the meantime, as may happen, that the ship is still swinging. The helmsman, knowing just what is desired and the amount of the change to be made, is thus enabled to act more intelligently and to avoid bad steering, which in narrow channels is a very positive source of danger.

Coast piloting involves the same principles and requires that the ship's position be continuously determined or checked as the landmarks are passed. On well-surveyed coasts there is a great advantage in keeping near the land, thus holding on to the marks and the soundings, and thereby knowing at all times the position, rather than keeping offshore and losing the marks, with the necessity of again making the land from vague positions, and perhaps the added inconvenience of fog or bad weather, involving a serious loss of time and fuel.

The route should be planned for normal conditions of weather, with suitable variations where necessary in case of fog or bad weather or making points at night, the courses and distances, in case of regular runs over the same route, being entered in a notebook for ready reference, as well as laid down on the chart. The danger circles for either the horizontal or the vertical danger angles should be plotted, wherever the method can be usefully employed, and the angles marked thereon; many a mile may thus be saved in rounding dangerous points with no sacrifice in safety. Ranges should also be marked in, where useful for position or for safety, and also to use in checking the deviation of the compass by comparing, in crossing, the compass bearing of the range with its magnetic bearing, as given by the chart.

Changes of course will in general be made with mark or object abeam, the position (a new "departure") being then, as a rule, best and most easily obtained. The pelorus should be at all times in readiness for use, and the chart where it may be readily consulted by the officer of the watch. The sextant should also be kept conveniently at hand.

A continuous record of the progress of the ship should be kept by the officer of the watch, the time and patent-log reading of all changes of course and of all bearings, especially the two and four point bearings, with distance of object when abeam, being noted in a book kept in the pilot house for this especial purpose. The ship's reckoning is thus continuously cared for as a matter of routine and without the presence or particular order of the captain or navigating officer. The value of thus keeping the reckoning always fresh and exact will be especially appreciated in cases of sudden fog or when making points at night.

Where the coastwise trip must be made against a strong head wind, it is desirable, with trustworthy charts, to skirt the shore as closely as possible in order to avoid the heavier seas and adverse current that prevail farther out. In some cases, with small ships, a passage can be made only in this way. The important saving of coal and of time, which is even more precious, thus effected by skillful coast piloting makes this subject one of prime importance to the navigator.

Change in the variation of the compass.¹—The gradual change in the variation must not be forgotten in laying down on the chart courses and bearings. The magnetic compasses placed on the charts for the purpose of facilitating the plotting become in time slightly in error, and in some cases, such as with small scales or when the lines are long, the displacement of position from neglect of this change may be of importance. The date of the variation and the annual change, as given on the compass rose, facilitate corrections when the change has been considerable. The compasses are reengraved once in ten years; more frequent alterations on one spot in a copperplate would not be practicable.

The change in the variation is in some parts of the world so rapid as to need careful consideration, requiring a frequent change of the course. For instance, in approaching Halifax from Newfoundland the variation changes 10° in less than 500 miles.

Local magnetic disturbance of the compass on board ship.—The term "local magnetic disturbance" has reference only to the effects on the compass of magnetic masses external to the

¹ See H. O. Chart No. 2406, Variation of the Compass.

ship. Observation shows that disturbance of the compass in a ship afloat is experienced in only a few places on the globe.

Magnetic laws do not permit of the supposition that the visible land causes such disturbance, because the effect of a magnetic force diminishes so rapidly with distance that it would require a local center of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow and the force strong, the compass may be temporarily deflected when passing over such a spot; but the area of disturbance will be small unless there are many centers near together.

Use of oil for modifying the effect of breaking waves.—Many experiences of late years have shown that the utility of oil for this purpose is undoubted, and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil, skillfully applied, may prevent much damage both to ships, especially of the smaller classes, and to boats by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows:

1. On free waves, i. e., waves in deep water, the effect is greatest.
2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances; but even here it is of some service.
3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when no other oil is obtainable, or it may be mixed with other oils; all animal and vegetable oils, such as waste oil from the engines, have great effect.
4. In cold water, the oil, being thickened by the low temperature and not being able to spread freely, will have its effect much reduced, a rapid-spreading oil should be used.
5. A small quantity of oil suffices, if applied in such a manner as to spread to windward.
6. It is useful in a ship or boat either when running, or lying-to, or in wearing.
7. When lowering and hoisting boats in a heavy sea the use of oil has been found greatly to facilitate the operation.
8. For a ship at sea the best method of application appears to be to hang over the side, in such a manner as to be in the water, small canvas bags, capable of holding from 1 to 2 gallons of oil, the bags being pricked with a sail needle to permit leakage. The waste pipes forward are also very useful for this purpose.

9. Crossing a bar with a flood tide, to pour oil overboard and allow it to float in ahead of the boat, which would follow with a bag towing astern, would appear to be the best plan.

On a bar, with the ebb tide running, it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside, bearing in mind that her natural tendency is always to forge ahead. If she is aground the effect of oil will depend upon attending circumstances.

11. For a boat riding in bad weather to a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil can be diffused well ahead of the boat, and the bag readily hauled on board for refilling, if necessary.

CHAPTER I.

GENERAL REMARKS ON THE WEST COAST OF AFRICA FROM CAPE PALMAS TO THE CAPE OF GOOD HOPE.

The portion of the West Coast of Africa described in this work extends from Cape Palmas, in approximately latitude $4^{\circ} 22'$ north to the Cape of Good Hope, and includes the French colony of the Ivory Coast, the British colony of the Gold Coast, the German colony of Togoland, the French colony of Dahomey, the British colony of Southern Nigeria, the German colony of the Kameruns, the Spanish territory of the Muni River, French Equatorial Africa, the small Portuguese possession of Kabinda, the Atlantic outlet of the Belgian Kongo, the Portuguese territory of Angola, the German Protectorate of Damaraland and Namaqualand, and the Union of South Africa as far as the Cape of Good Hope. The off-lying islands, Fernando Po, Princes, San Thomé, and Annobon, in the bight of Biafra, are also included, as well as Ascension, St. Helena, and the Tristan da Cunha group.

IVORY COAST.

The French colony of the Ivory Coast has a seaboard nearly 290 miles in length, extending from the mouth of the Cavally, or Du River, about 13 miles eastward of Cape Palmas, nearly to Newtown, the eastern boundary of the colony being about $\frac{1}{2}$ mile westward of the latter place. The governor of the colony resides at Grand Bassam.

The Ivory Coast is well known for its dangerous surf, which is a great hindrance to the safe landing of passengers and cargo.

The only plant extensively cultivated is coffee.

Exports.—The exports consist chiefly of wood, ivory, india-rubber, palm oil, etc.

Ports.—The principal ports are Grand Drewin, Grand Lahú, Amokwa (Half Jack), Port Bouet, Grand Bassam, and Assini.

Communication.—The Ivory Coast is visited by the steamers of the Chargeurs Réunis Line from Bordeaux, once a month; the Fraissinet Line from Marseille, once a month; Elder, Dempster & Co.'s Line from Liverpool, three times a month; Elder, Dempster & Co.'s Line from Hamburg, once a month; and the Woermann Line from Hamburg, once a month.

A railway is being constructed from Abijeau, on the northern side of Grand Massam Lagoon and in 1912 was reported completed to Dimbokro, a distance of 114 miles.

Telegraph.—All the military and trading ports of any importance are in telegraphic communication, and there is an overland route by which Dakar is in communication with the Ivory Coast via Timbuktu. Axim, on the Gold Coast, is also in communication.

Grand Bassam is in telegraphic communication with Europe. There is a cable from Grand Bassam to Kotonu and telegraph stations at Drewin, Sassandra, Fresco, Grand Lalu, Grand Bassam, Jack Jack, and Assini.

Climate.—The Ivory Coast has two rainy seasons in the year, and sickness is most common among Europeans during the month of October, with northeasterly winds. Yellow fever is endemic at Grand Bassam.

GOLD COAST.

The British colony of the Gold Coast, with Ashanti and the Northern territories, is comprised between a straight line from the seacoast at about $\frac{1}{2}$ mile westward of Newtown to Tando Lagoon, then along the left bank of that lagoon, of Ehi Lagoon and Tano River as far as Nugua, and then to the eleventh degree of north latitude, and Aflao, in longitude $1^{\circ} 14'$ east, the boundary of the German colony of Togoland.

According to the last census, taken in 1911, the colony and protectorate has a population of, approximately, 1,503,386.

The original coast line along the Lagos colony to the Volta and farther westward must have been the northern bank of the inner line of inland waters. The strips of land that now intervene between the sea and mainland and the deltas here and there have been formed by the continuous action of the surf, current, and prevailing winds upon the débris brought down by the different intersecting rivers. These are fringed with mangroves and saltbush, a willowlike shrub.

This colony is specially rich in palms of various species, and the inland hilly districts are covered with dense forests of gigantic timber.

Products.—The land is naturally rich, the soil producing almost any commodity of marketable value, and though not generally cultivated, maize, yams, cassava, and plantains are grown. This coast is the region of palm oil, extracted from the fruit of a certain species of palm, which grows in great profusion; also rubber trees, and vines, the kola tree with its valuable nut, and mahogany and other important woods.

A botanical station was established at Aburi in 1890, and a quantity of Indian jute has been grown and allowed to seed, the seed

- being distributed in various districts. The Para rubber plant has also been raised and distributed widely.

Gold is obtained in the Wassaw district, veins of silver, copper, and tin have been met with in the hills, and iron and manganese occur everywhere. Gold mines are also worked in Ashanti and especially in the Provinces of Dadeassi and Inquanta.

Elephants, once common, are now seldom seen, and for some distance from the coast scarcely any game is to be met with, but in the more inland savannahs, especially in the Okwahu district, west of the Volta, elephants, buffaloes, gazelles, wild boars, and various kinds of carnivora abound. The hippopotamus and crocodile are numerous in the Volta.

The tsetse fly, or an analogous species, is fatal to cattle, and ants are very troublesome. A species of snail is said to constitute the staple food of Ashanti.

Trade.—The produce of the Gold Coast is sent chiefly to Great Britain. Gold is one of the principal exports, and palm oil, palm kernels, cocoa, lumber, and india rubber are also largely exported.

Ports.—The chief settlements are Axim, Dix Cove, Sekondi, Chama, Elmina, Cape Coast Castle, Winneba, Akkra, and Kitta.

Communication.—There is in normal times a British weekly service of mails conveyed by the British and African Steam Navigation Co. and the African Steamship Co. between the principal ports of the colony and the United Kingdom, calling at Axim, Sekondi, Cape Coast Castle, and Akkra. Outward-bound vessels proceed direct from Liverpool to Sierra Leone or Monrovia, and homeward call at the Canary Islands, Madeira, or both. There is also a German line monthly; and the steamers of one or two French companies sailing from Marseille call irregularly outward and homeward at Gold Coast ports.

A railway extends from Sekondi to Kumasi (168 miles) via Tarkwa. A railway is under construction from Akkra to Mangoase, of which 40 miles has been completed.

There are cables from Akkra to Sierra Leone, Grand Bassam, Kotonu, and Lagos, and land wires to Kintampo, Bole, and Yegi; telegraph stations at Axim, Dix Cove, Ajua, Chama, Elmina, Cape Coast Castle, Anamaboe, Salt Pond, Appam, Winneba, Pram Pram, Adda, and Kitta.

There is a radio station at Akkra.

Climate.—The arrangement and phenomena of the seasons are the same as on the coast lying farther west. Tornadoes in March or April indicate the advent of the wet season, these gradually falling off as the rains set in. With the commencement of the dry season the monsoon reappears, after which, in October, the short rains and most

unhealthful season for Europeans commence. Dry weather sets in about the new year, and then the harmattan is most prevalent.

The climate is malarious. African fever and dysentery are the most common diseases; yellow fever is unknown. The mean temperature in the shade is 82°.

It has been stated that Europeans of sound constitution, who practice habits of moderation, generally suffer little from the effects of a not too-prolonged residence in the colony; and that it is important that Europeans should live as far as possible from the native habitations, as by doing so they will be less exposed to malarial infection by mosquitoes.

It is also stated that the climate of the northern territories of the Gold Coast colony is much superior to that of the coast. Except during the rains the air generally is dry and free from the moisture that is so oppressive on the coast.

TOGOLAND.

The German colony of Togoland extends from longitude 1° 14' east to longitude 1° 39' east, and has an area of 23,160 square miles, about one-twentieth of which is under cultivation, the chief crops being maize and groundnuts.

There is a native population of about 850,000 and (in 1903) a white population of 168.

The present capital of Togoland is Anecho (formerly Little Popo).

Ports.—The ports are Lome and Anecho.

Trade.—India rubber and ivory are the principal exports.

Communication.—Steamers of the British & African Steamship Co. call monthly at Anecho.

Lome is connected by railway with Anecho and Palime.

Togo, the old capital, is in telegraphic communication with Kotonu, and there are telegraph stations at Anecho, Agweh, Great Popo, and Whyda.

Climate.—There are two wet and two dry seasons, and the mean annual temperature is about 78°. November to February, inclusive, are the most healthful months; the temperature in the shade varies little by night or day.

Europeans are subject to marsh fevers on first arrival on this coast, also at the close of the heavy rainy season, when the atmosphere is full of miasmatic exhalations. Among the natives there is much smallpox.

DAHOMEX.

The seaboard of the French colony of Dahomey extends about 64 miles from the eastern boundary of Togoland to the Ajarra River, in approximately longitude 2° 44' 30'' east. The population of the

colony in 1914 was 911,637. Its capital is Abomey, situated on a plateau 800 feet high, 50 miles in a direct line from the coast.

Trade.—The exports are chiefly palm oil and palm kernels, and the imports principally wine and spirits, woodwork and timber, machinery, powder, flour, rice, and general commodities.

Ports.—The principal port is Kotonu, a well-planned modern town located on the beach. The other ports are Agweh, Great Popo, and Whyda, and the important trading town of Porto Novo is in this territory.

Communication.—Steamers of the British & African Steamship Co. and of the French lines, Chargeurs Réunis and Fraissinet, call at the Dahomey ports, and also German steamers of the Woermann Line. The only communication between Kotonu and Porto Novo is by a shallow lagoon. Light-draft steamers run between Porto Novo and Lagos.

From Kotonu a railway into the interior is open as far as Save (156 statute miles), with a branch line to Whyda and Segborue on Lake Aheme; the line is intended to run to Chaoru. A railway is under construction from Porto Novo to Pobe, along the Lagos frontier.

There are cables to Grand Bassam, Lagos, and the Gabon River.

Climate.—Owing to bad sanitary conditions at Porto Novo, the mosquitoes are a perfect plague, and as a result the health of Europeans is very unsatisfactory, both malarial and blackwater fever being very prevalent. Abomey, situated as it is on a plateau, has practically no mosquitoes, and is consequently the most healthful part of the lower Dahomey.

SOUTHERN NIGERIA.

The British colony of southern Nigeria has a seaboard of about 430 miles, extending from the Ajarra River, its western boundary, to the right bank of the Rio del Rey, in approximately longitude 8° 44' east. The colony includes the territories on the basin of the Niger and its affluents, as far as Ida on the Niger.

The population of Nigeria was 17,000,000 in 1911.

Ports.—The principal ports are Lagos, Burutu (Forcados), Bonny, and Old Calabar.

Products.—The most important natural products are palm oil and palm kernels. Camwood grows, and barwood has been brought from the interior; dyewoods and gum are said to be abundant, and gold is reported in the interior. The fishing industry is growing in importance.

Trade.—Palm kernels, palm oil, rubber, cocoa, and coffee are the chief exports; ivory is also exported.

Communication.—Steamers of the African Steamship Co. and British & African Steam Navigation Co., carrying mails, have a regular fortnightly service to Lagos; other steamers call at irregular periods, and Lagos has communication with the interior by means of the lagoons and creeks, which extend in all directions.

A railway connects Lagos with Otta, Abeokuta, and Ibadan and is to be extended.

Lagos has telegraph communication with Sierra Leone and Europe. There are cables to Akkra, Kotonu, Brass, and Bonny Rivers, land lines to Saki and Jebba, and Zungura via Ibadan, and to Forcados. At Bonny there is a cable to the Kameruns, Princes, and San Thome Islands, and the Gabon River.

There is a radio station at Lagos.

Climate.—The climate of Lagos is peculiarly fatal to the European constitution, which is probably due to the fact that the town is built on an alluvial island at the mouth of the river, and to a congested native population residing, under very insanitary conditions, in a small corner of this island. Sickness has been generally found to follow the curve of the rainfall, and the most fatal months, December and January, appertain to the second curve, or drying up of what is known as the "little rainy season." At Ibadan, about 50 miles from the lagoon, the climate is comparatively healthful.

Malarial fevers, dysentery, diseases of the liver and spleen, and sunstroke are the diseases due to climatic causes, against which special precautions are requisite. The rainy season is from May to October.

The Kameruns.—The German colony of the Kameruns, which is situated in the northeastern part of the Bight of Biafra, and adjoins Nigeria on the northwest, French Equatorial Africa on the east and south, and Spanish Guinea on the southwest, has a coast line extending from the left bank of the Rio del Rey to Campo River, and includes Kamerun River and the Kamerun Mountains, or about 200 miles between latitude $4^{\circ} 40'$ and latitude $2^{\circ} 21'$ north. The protectorate, which is divided into four districts—Duala, Edea, Victoria, and Kribi—covers an area of 191,130 square miles. The seat of government is Buea.

There are mangrove swamps along the greater part of the coast extending sometimes 20 miles inland, pandanus and raffia palms on the lowlands, and higher up forests of large trees are matted together by a tangled network of tall creepers, beyond which is a plateau covered with high, reedy, and hard grasses. The cultivated plants are coconuts, oil palms, bananas, yams, ground nuts, sweet potatoes, cassava, and especially colocasia, the taro of the South Sea Islands, also cocoa, coffee, rubber, and kola.

India rubber is extracted from *Candolphia florida*, a species of creeper about 200 feet long, which grows on the Kamerun Mountains.

Wild boars have been shot in the marsh lands, as well as pelicans, herons, snipe, etc.

In the larger rivers hippopotami, crocodiles, tortoises, and crabs exist, while on the banks snakes are found.

In the forest proper herds of elephants, antelopes, buffalo, monkeys, squirrels, and pigs are to be found; guinea fowl and pheasants also; mosquitoes, sand flies, and ants abound.

Every fourth year, in the months of August and September, the river and neighboring estuaries swarm with little yellowish shrimps of the *thalassina* species, so closely packed that they are caught in baskets.

Mountains.—The protectorate is situated on the northwestern side of the central African plateau; the eastern part is flat, gradually rising to the westward to mountain ranges, running north and south. In the northwestern part is a sharp rise to a grassland plateau, 4,000 feet high.

The Atlantika Mountains, 4,830 feet, are in the northwestern, the Mandara Mountains in the northern, and the Maneguba Mountains, 7,870 feet high, and Kamerun Mountains, 13,300 feet, in the southern part of the protectorate.

Rivers.—There are numerous rivers along the coast, but rapids prevent their being fully utilized; the principal are: Rio del Rey, the estuary being formed by the Mashantu, Meta, Adonkat, and Meme Rivers; the Kamerun, formed by the Mungo, Wuri, Abo, and Dibamba Rivers; the Sannaga and its tributary the M'Bam; the Nyong, Lokunje, Kribi, and Campo.

Lakes.—Lake Chad is 125 miles in length and 38 broad; 62 miles of the southern shore of this lake come into the protectorate. The average depth is from 10 to 12 feet in the lake, which is gradually decreasing in size. Two comparatively small lakes, the Barombi and Soden, are situated about 30 miles northward of the Kamerun Mountain.

Population.—The Kameruns protectorate has an estimated population of 3,500,000; the total number of white residents in the colony in 1913 was 1,871.

Products.—Cocoa, palm oil and seeds, india rubber, ivory, ebony, and some dyewoods; coffee, tobacco, and cotton are also grown, and some tea for experiment.

Petroleum is said to have been discovered in the district of Duala.

Communication—Steamers.—German vessels from Hamburg call twice a month. The British & African Steamship Co. has a regular fortnightly service to the Kamerun River, and several

steamers call at regular periods. Communication with the interior is kept up by a river service of small steamers and launches. There are also some good roads, and more projected or constructing.

Patent slip.—There is a patent slip for small vessels at Belltown.

Ports.—The principal ports are Victoria and Duala.

Railway.—The Manenguba Railway is completed for a distance of nearly 100 miles. A line from Duala to Edea and Widimenge is in construction. A line is projected from Bonaberi to Lake Chad.

Telegraph.—There is a submarine cable direct to Germany and one between Kamerun and Bonny. Many places within the protectorate are connected by telegraph and telephone.

Climate.—There are regular rainy and dry seasons, clearly defined; between them tornadoes and heavy thunderstorms occur, doing considerable damage. These seasons differ in different localities, as also does the amount of rainfall. The annual rainfall at Victoria is about 83 inches, whereas at Debunja and Bibundi it is said to be about 370 and 300 inches, respectively.

The driest months in the Duala district are from November to February, but there is no month really without rain. At Kribi there are two rainy seasons—March to May (light), July to December (heavy).

The country is unhealthful, especially on the coast. Malaria, black-water fever, and dysentery are prevalent. Smallpox and skin diseases are endemic among the natives.

Land and sea breezes are experienced, and as the land wind passes over the lofty Kamerun Mountain, the night air is rendered cool and refreshing.

Spanish West Africa or Guinea.—This Spanish colony has Kamerun colony on its northern side, and French Kongo on its eastern and southern sides; it also contains the islands of Fernando Po and Annobon; its coast extends from the Campo River to Corisco Bay, including Corisco and the Elobey Isles. The last-named territory was ceded by France to Spain in 1901, the boundary between the Spanish and French territories agreed upon being the waterways of the Muni and Temboni Rivers until the latter reaches the first parallel of north latitude, thence along that parallel to the meridian of $11^{\circ} 20' 14''.6$ east of Greenwich, thence along that meridian to the frontier of the German colony of the Kameruns.

The coast region is low and marshy and contains vast forests. The vegetation is luxuriant, and at places along the coast there are Spanish, French, and English factories. There are no harbors and the rivers are inaccessible to shipping.

Communication.—British steamers from Liverpool call once a month, and Spanish vessels from Cadiz twice a month.

Trade.—No returns are available of the trade of Corisco; they are included with those of the island of Fernando Po. The principal exports are rubber, ebony, ivory, palm oil, and kernels.

French Equatorial Africa, situated with its western boundary, the coast line of about 475 miles, between the Muni River as mentioned above in about latitude $1^{\circ} 02'$ north, and Massabe in latitude $5^{\circ} 02'$ south, joins through protected territory, the French Protectorate of the Sahara, which meets the common hinterland of the northwest possessions. Inland it is bounded on the south and east by the Belgian Kongo and the Sudan, and on the west by the Kamerun territory and Spanish Guinea; it consists of the colony of Gabon, the Middle Kongo, and the Ubangi and Lake Chad territories.

The Gabon district was first colonized by the French in 1841; the center of administration at Libreville on the Gabon River was founded in 1849. Here there is a naval and military establishment.

Area—Tribes.—The French Equatorial Africa is estimated to have an area of about 669,280 square miles, and to contain a population roughly numbering about 9,000,000.

The principal tribes and their localities are as follows: The M'Pongue (Gabon territory), M'Benga (Gabon River), Chake (Ogowe), Loango (on the coast), M'Fan or Pahuins, hunters, and for the most part cannibals (left bank of the Ogowe), Batekes, laborers and tradesmen (the highlands), M'Boch, thieves, cruel and treacherous (the lowlands, Alima), and Bafourous (on the northern bank of the Kongo as far as Ubangi).

Products.—The chief products of French Equatorial Africa are rubber and ivory; the latter is brought from the interior in great quantities, and said to be the finest in West Africa; it also produces redwood, producing a dark red dye, and ebony, the latter being obtained from the great forests near the headwaters of the Gabon. The redwood is found along the banks of the rivers and creeks. Vegetation throughout is magnificent, and woods of various kinds, adapted for all purposes, abound. The country and soil are well adapted for cotton and other tropical commodities not indigenous to the country; coffee, vanilla, and cocoa have already been introduced, and sugar cane grows luxuriantly on the banks of the river.

Trade.—The principal exports from French Equatorial Africa are ivory, rubber, cocoa, coffee, ebony and other wood, gum copal, and palm oil; the imports consist chiefly of cotton goods, spirits, ammunition, tobacco, rice, and salt.

The trade of Loango may be said to consist of two parts—that dependent upon the transport of goods to the Upper Kongo, and that of the trade natural to it drawn from the country round about.

The former trade, known as the caravan business, is by far the most important, and great quantities of manufactured goods are imported, as the means of carrying it out.

Ports of French Equatorial Africa are Libreville, on the Gabon River, Sette Cama, Mayumba, and Loango.

Communication.—British steamers from Liverpool monthly, German steamers from Hamburg monthly, and French steamers every month from Havre and every alternate month from Marseille.

Telegraphs.—Libreville is connected by cable with Europe, and also with Brazzaville by cable across the Gabon. The towns near the coast are connected by wire.

Kabinda.—The Portuguese territories of Kabinda and Lendana, situated north of the Kongo, which embrace the coastline from Massabe in latitude $5^{\circ} 02'$ south to Red Point in latitude $5^{\circ} 43'$ south, contain an area of about 2,030 square miles, and form a district under the governor general of Angola.

Population.—The population is estimated to number about 30,000. The natives of the Kabinda Tribe are docile, industrious, and intelligent; they manufacture cloths for their own use and construct boats for carrying on commerce along the coast.

Trade.—The trade at Kabinda is in ivory, gum, wax, and honey; there is also a little orchilla and gum copal.

Communication.—British steamers from Liverpool monthly. Portuguese steamers twice a month from Lisbon.

Belgian Kongo.—The State is divided into 22 districts (including four in the Katanga), and these into "territoires," each administered by a European official. The sea coast belonging to this State is about 20 miles in extent and lies between Kabinda Territory and Kongo River, the northern limit being Red Point in latitude $5^{\circ} 43'$ south. The territory of the Belgian Kongo includes the right bank of the Kongo nearly to Shonzo; both banks of the river thence to Manyanga; the left bank only as far as the equator, and thenceforth both banks. On the south the frontier line runs due east from the Portuguese town of Noki, on the parallel of latitude $5^{\circ} 52'$ south, as far as the Kuango River. To the eastward it extends to Lake Tanganyika.

The Kongo Territory is intersected by numerous rivers, which have their rise in the extensive mountain ranges of the interior, to which the Portuguese have given the names of Do Sal, Do Sal Nitro, and Do Cristol. The State was assigned to the King of the Belgians in 1884, but in September, 1908, was transferred to the Belgian Government; it is about 802,000 square miles in extent. Boma is the capital.

The **Katanga** is administered as a separate Province by a vice-governor general, since September, 1910. It lies in the very center of Africa, between Lake Tanganyika on the east, the Sankurru River

on the west, and Northern Rhodesia on the south. It is a region rich in copper and tin. Elizabethville, the terminus in 1911 of the railway from Cape Town, is the principal township. The white population of the whole Katanga district on January 1, 1912, was between 1,800 and 2,000. When the railway is completed to Bukama there will be through connection between Cape Town and Boma by rail and water.

The Kongo River, with its many navigable tributaries, constitutes the leading feature of this State. It is navigable for large vessels from its mouth at Banana to Matadi, distance about 80 miles, where the European steamers discharge their cargo; but between that place and Leopoldville, on Stanley Pool, which places are now connected by a railway, there occur rapids and falls. Above Leopoldville the river is navigable as far as the Stanley Falls, a distance of 900 miles. The largest vessel plying on the Kongo, in 1907, between Leopoldville and the Stanley Falls had the following dimensions: Length overall, 97 feet; beam, 19 feet 3 inches; depth in hold, 4 feet; draft, fully loaded, 2 feet.

Population.—The native population of this territory, estimated to number probably from 14,000,000 to 15,000,000, consists of numerous Negro tribes, of whom none have as yet attained more than a thin veneer of civilization, while some still practice cannibalism. Sleeping sickness is said to be making great ravages among the inhabitants, especially in the Lower Kongo.

The white population in January, 1912, amounted to 5,465, of whom 3,307 were Belgians and 505 British subjects, the remainder being of various nationalities.

Products.—The soil of the Kongo Territory is exceedingly fertile, and the vegetation luxuriant; the coffee plant, sugar cane, and cotton grow wild, and tobacco has been cultivated with success. Fruits and vegetables, such as are to be found in inter-tropical climates, are procurable, and it is believed that the cereals of Europe might be introduced with advantage. Iron, copper, and other minerals have been found, and the forests contain many species of valuable woods.

Trade.—The exports consist mainly of rubber, but palm kernels, palm oil, ivory, copal, cocoa, gold, and some minor articles are also exported.

Standard time.—The time kept throughout the Belgian Kongo is that of the meridian of 15° east, or one hour fast on Greenwich mean time.

Communication.—British steamers from Liverpool once a month, French steamers from Havre once a month, Portuguese vessels on return to Lisbon once a month, and vessels under Belgian flag from Antwerp twice a month.

There are 13 radio stations in Kongo State.

Railways.—During the first half of 1914 the construction of railways progressed in a satisfactory manner, but since the outbreak of war work has almost ceased. The “Cape-to-Cairo” line is now linked up with the exception of two sections in Kongo. The southern part of the system is in operation with through trains from Cape Town to Kambove, Kongo, a distance of 2,399 miles. Construction work from Kambove to Bukama, where the navigable part of the Kongo River is reached, has progressed as far north as Tshilongo, the present railhead 65 miles from Kambove, and the earthworks have been completed 40 miles farther. This leaves about 155 miles of rail to be laid in order to connect Cape Town with Bukama, the total distance of this section of the line being 2,620 miles.

Between Bukama and Stanleyville, a distance of 600 miles, a good steamer service is operated by the *Chemins-de-fer des Grands Lacs*, two short sections (Kongolo-Kindu and Ponthierville-Stanleyville), where there are rapids, being paralleled by railway lines. From Stanleyville the “Cape-to-Cairo” route will continue in a northeasterly direction to Mahagi, on the western shore of Lake Albert, the only important section of the system not yet under construction; the survey, however, has been made and shows that it will be about 548 miles long.

At Mahagi the Uganda Government steamers ply northward on the Nile, which is practically navigable from Lake Albert to the railhead south of Khartum, where the Sudan Government trains and steamers and the Egyptian Railway take the traveler through to Cairo and Alexandria.

Between Mahagi and Cairo the only section yet to be built is from Rejaf to Dufle. Here the Nile is full of rapids, and it was formerly proposed to construct a railway line about 120 miles in length around them, but engineers making the last survey have recommended that a lock be built on the river at Dufle which will render navigation possible between the two towns.

Transcontinental route from east to west.—The transcontinental route from east to west is now entirely completed, the Kabalo-Lake Tanganyika line having been opened to traffic during the first months of 1915. Owing to the war, however, the system is not yet in operation, but after the close of hostilities it will be possible for the traveler to cross Central Africa, from Banana, at the mouth of the Kongo River, to Dar-es-Salam, on the Indian Ocean, by water and rail in practical comfort. Distances along the route are as follows: Banana to Matadi by river, 85 miles; Matadi to Leopoldville by rail, 260 miles; Leopoldville to Stanleyville by river, 1,000 miles; Stanleyville to Ponthierville by rail, 70 miles; Ponthierville to Kindu

by river, 220 miles; Kindu to Kongolo by rail, 150 miles; Kongolo to Kabalo by river, 50 miles; Kabalo to Albertville on Lake Tanganyika by rail, 166 miles; by steamer across Lake Tanganyika to Kigoma, 95 miles; Kigoma to Dar-es-Salam by rail, 950 miles. The total distance of the route across the continent is therefore 3,046 miles; all but the last section (Kigoma-Dar-es-Salam) is in Belgian Kongo, and the transcontinental trip could be made, with good connections, in 40 days. The gauge of the railways in Kongo (Matadi-Leopoldville) is 2 feet 5½ inches, and that of the German line (Kigoma-Dar-es-Salam) 3 feet 3¾ inches. It is interesting to note that Lake Tanganyika is 2,642 feet above sea level.

Telegraph.—Leopoldville is connected via Brazzaville and Libreville with Europe. Matadi, Boma, Leopoldville, Coquilhatville, Lisala, Umangi, Kasongo, and Baraka on Lake Tanganyika are connected by telegraph; there are also 50 miles of telegraph in Mayumba.

Angola.—This is a Portuguese possession, bounded on the north and northeast by the Belgian Kongo, on the east by Rhodesia, and on the south by the German territory of Southwest Africa; its northern boundary is the left bank of the Kongo River from Noki to the coast, its western boundary the coast from thence to the Cunene River in latitude 17° 16' south, which river forms the boundary between the Portuguese and German possessions. Angola, the corruption of N'Gola, was discovered by Diogo Cao in 1486. It has been a Portuguese colony since 1575, then under Novaes, governor general; it was relinquished on account of the Dutch invasion in 1641, but it was recovered in 1648 by Salvador Correia. It has an area of about 510,670 square miles. There are 6 districts, Loanda, Lunda, Kongo, Benguela, Mossamedes, and Huilla. The country is only partially subdued, the northeastern portion, the Province of Lunda, is hostile; commerce has, in consequence, made little advance, though the country is rich in resources. The natives are becoming intemperate and indolent, but cotton growing, mining, industries are being promoted, and means of communication improved to counteract this. A number of steam launches for the navigation of the rivers have been ordered, and the rivers cleared from obstruction. The capital is Loanda.

Population.—The population of Angola is estimated to be 4,119,000. The most important natives in the country are called collectively Ovibundu, but they comprise many smaller tribes. They speak the Umbundu language, which is the equivalent of the Swahili on the east coast of Africa, and is the trading language. The native of Western Angola is chiefly employed in the carrying business.

Trade.—The principal exports from Angola are rubber, coffee, wax, palm oil, and palm kernels. Large quantities of dried fish are exported from Mossamedes to other ports in the Province, and to San Thome and Princes Islands, but none to Europe.

The chief imports are cotton goods, groceries, wine, etc., gunpowder, metal and hardware goods, railway material, etc.

Ports.—The chief ports of Angola are Loanda, Ambriz, Benguela, Lobito, and Mossamedes.

Communication.—British steamers leave Liverpool every month for Angolan ports, German steamers from Hamburg once a month, and Portuguese vessels from Lisbon three times a month.

Railways.—In 1886, a transcontinental railway was started at Loanda, but had to be abandoned on reaching Ambaka, in 1894—its provisional terminus will be the Cuango River, and the final one Kasai. The work has been resumed, and in August, 1909, the rails had been laid to Malange, 87 miles farther on. In 1902 another line was projected from Lobito Bay to the Katanga mines—eventually to join the South African union system. This road was in September, 1912, open over 268 miles of line from Lobito to Huambo on the Central African plateau, and a further contract was made for the continuance of the construction to 325 miles. It is the highest railway in South Africa, rising to 6,090 feet at 240 miles from Lobito. Another railway has been constructed from Mossamedes, and has been completed inland for a distance of 78 miles to a place called Munino.

Telegraph.—Mossamedes is connected with Huilla and Loanda with Dondo and Kasongo, a distance of 228 miles, also with Ambriz, Kiasembo, Myssera, Ambrizette, and San Antonio at the mouth of the Kongo.

Climate.—The climate of Angola is changeable, generally hot and damp near the rivers and on the coast, but cooler in the interior. The winter and harvest season is from about May to September; it is called Caçimbo (Kasimbo), or cold season, and is healthful, with cloudy weather and fogs in the morning. The summer is from about October to June; it is hot and sickly, the most unhealthful months being March and April.

Diseases.—The principal diseases are dysentery, fever, ague, and smallpox, the last named being chiefly confined to the natives.

Damaraland and Namaqualand, which are German possessions, under the title of German Southwest Africa, have a coast line of about 800 miles extending from the Cunene River on the north, to as far as Orange River on the south, with the exception of Walfisch Bay, which is British. The territory contains about 322,350 square miles, and is bounded on the north by Angola, on the east by Bechuanaland, and on the south by Union of South Africa.

The coast from Cape Negro to beyond Ichabo Island, off Luderitz Bay (Angra Pequena) is a desert region of arid sands and nearly rainless, though at times heavy dews prevail.

Population.—There are 79,556 persons, belonging to the Hottentot and Bushman, the Bantu and the Damara races. The white population, not including the military, was 14,816 in 1913.

Between the locality of Great Fish Bay and Union of South Africa, the coast is inhabited by various tribes, the principal being the Cimbebas, who dwell in the country of Cimbebas between Great Fish Bay and Cape Cross, and the Hottentots, who occupy the Hottentot country, thence to the southward as far as Orange River. The natives along this coast are very sparsely distributed and, though generally harmless, are of little service to civilized men. The capital is Windhoek or Windhuk.

The exports from German Southwest Africa consist principally of guano, hides, ostrich feathers, diamonds, and copper ore.

The imports consist of Government property, beer, preserved provisions, spirits, stuffs, and fabrics.

Since January 1, 1900, only such weights and measures are allowed to be used in the colony as have been stamped with the metrical weights and measures provided for by law.

Ports.—Swakopmund (the principal), Luderitzort (Angra Pequena), Cape Cross, and Omaruru.

Communication.—Besides the regular monthly service of the Woermann Line from Hamburg to Swakopmund, there is communication with Cape Town by steamer every three weeks.

Railways.—A railway connects Swakopmund, Dindhoek, Otavi and Grootfontein, and Tsumeb. Luderitzort and Keetmanshoop are also connected. The Keetmanshoop-Windhhoek line is now open for traffic, as is also a line from Seeheim to Kalkfontein, the total mileage of railway line open in 1911 being 1,320 miles.

Telegraph.—Swakopmund is in direct telegraphic communication with Mossamedes and Cape Town by means of a branch submarine cable. There is also an overland service. There is a good telephone service in the towns and villages.

British South Africa.—By the South Africa act, Cape Colony, Natal, Transvaal, and Orange River Colony are united as from a date, September 20, 1909, within one year of the passing of the act.

Capitals.—The seat of government is Pretoria, but the legislature is at Cape Town.

Walfisch Bay.—This small possession, which forms part of the Province of the Cape of Good Hope, in the Union of South Africa, is about 30 miles in extent north and south, and comprises an area of about 430 square miles; it is surrounded by the German territory.

A German flagstaff and notice board stand near the northern bank of the Swakop River, and British beacons near the southern bank; the northern boundary line lies midway between, in the bed of the river.

Population.—The natives of this possession chiefly reside at Zandfontein and Rooibank, $2\frac{1}{2}$ miles and 16 miles, respectively, from the settlement, and in 1911 numbered 1,438 persons; there were also 1,638 white persons.

The resident magistrate is the chief Cape Government official.

Trade.—From 1,200 to 2,000 tons of imported trade goods pass through the interior annually; other imports are food, breadstuffs, etc. There are no exports except a few skins.

Communication. — German steamers from Hamburg call monthly; there is also communication with Cape Town by steamer every four weeks.

Islands.—In addition to the settlement at Walfisch Bay, where there is a resident British official, there are 12 islands off the coast of German Southwest Africa which belong to Great Britain. These are known as Plum Pudding, Sinclair, Hollams Bird, Mercury, Ichabo, Seal, Penguin, Halifax, Long, Possession, Albatross, and Pomona Islands, and with adjacent rocks were annexed by Great Britain in 1867, and added to Cape Colony in 1874.

Province of the Cape of Good Hope—Extent.—The Cape of Good Hope, strictly speaking, is the small promontory forming the southwestern extremity of the continent of Africa. But the extensive Province of this name, in which are now included the Transkei territories, Bechuanaland, and Pondoland, is washed by the waters of the South Atlantic and Indian Oceans on the west and south; is bounded on the north, to the west of the meridian of 20° east (where it is conterminous with German Southwest Africa), by the Orange River; and on the northeast by the Orange Free State, Basutoland, and Natal. Its extreme length from east to west is nearly 600 miles and its breadth 450 miles, with a coastline of about 1,200 miles and an area of 276,995 square miles.

The country directly south of the Orange River consists of a series of 3 terraces divided by mountain ranges varying in height from 4,000 to 8,000 feet, and rising gradually in a series of open sterile plains from the river as far as the parallel of latitude 32° south, whence it gradually declines from north to south; the culminating point is the Spitzkoss or Compass Berg, the passages from one plateau to another are by well-made passes through the narrow and difficult gorges or kloofs. One of these plateaus is known as the Great Karroo, 300 miles in length, east and west, with a breadth of 70 miles, where streams exist. During a great portion of the year the Karroo, as its name implies, is a dry barren district, but immedi-

ately after heavy rain the whole area is covered by a profuse and varied vegetation. The country to the north is still more elevated and forms part of the great South African table-land. Generally speaking, the eastern and southern portions of the Province receive an abundant water supply, are well wooded, and extremely fertile.

The southwestern part of the Province produces grain and wine, in the southern part forests exist, and in the southeastern parts tobacco and maize are cultivated.

Mountains.—The principal mountain ranges are Olifants Zit-zikama, the summit of which is Great Winterhoek, 6,818 feet; Groote Zwarte Bergen, its highest peak being Cockscomb Mountain, 5,773 feet; and the Roggeveld Sneeuw Bergen Range, having Compass Berg, 8,209 feet, the highest peak in the colony for its apex.

Rivers, though numerous, are practically useless either for navigation or irrigation; most of them flow in deep and precipitous ravines, and except when swollen by the rains are mere shallow torrents; even the largest have bars at their mouths, which render in most cases entrance both difficult and dangerous; but much has been done in recent years to render some of the bars navigable. The two principal streams on the west coast are the Orange and Olifant Rivers. The former is the most important, rising as it does near Mont aux Sources, Basutoland, it drains about 400,000 square miles of country.

Climate.—The climate is healthful, dry, and the temperature uniform, and very favorable to people of European birth. The prevailing wind is from the southeastward in the summer, bringing rain to the southern, eastern, and central parts, but it is a dry wind in the western portions. In the winter the prevailing wind being from the northwestward the rain falls in the western and not in the eastern localities.

Flora—Fauna.—The principal native flora are heaths, proteæ, and stapelias (or carrion flowers), and dense thorny thickets, called bush, containing several species of aloes. Native animals are disappearing, but buffaloes are found on the south coast, and springbok abound.

Capital.—Cape Town, the capital of the Province, and the seat of legislature, stands on the western shore of Table Bay, between it and the foot of Table Mountain.

Government.—The administration of the government of the Province is conducted by the governor, with the advice of an executive council. The legislature consists of a governor, a legislative council, and a house of assembly. Parliament meets once a year. Members of parliament are elected for seven years and are paid.

The population of the Province on April 17. 1904. inclusive of Pondoland and Griqualand West, was by census 2,409,804, the Euro-

peans numbering 579,741 of the whole, the remainder consisting of Kaffirs, Malays, and other colored races. The Dutch preponderate in the western and the English in the eastern districts.

The natives.—The Bushmen are the earliest known inhabitants of South Africa. They are of the lowest type of humanity, and frequented the Kalahari Desert, Namaqua, and Damaralands. The few that remain are to be found in Calvinia, Kenhardt, and Namaqualand. They are small in stature, and their life is more that of animals than men. Their language appears to be one of sound rather than articulation. Their inveterate enemies were the Hottentots and Bechuanas, who did their best to exterminate them long before the arrival of Europeans.

The Hottentots at one time dominated the colony. Their origin is unknown, but they were fully established in the fifteenth century. Their habits were nomad and pastoral. The pure Hottentots are now nearly extinct.

The Griquas are the result of contact between the Hottentots and the Kaffirs and Boers. They are, though a mixed race, the descendants of the Hottentot line and retain their tribal organizations. In appearance they are thin and wiry, of medium height, of pale yellow color, high cheek bones, and flat noses. From their hereditary pastoral temperaments they make good farm servants, etc.

The native population of the eastern districts are the Kaffirs of the Amaxosa Tribe, one of the four great tribes which were found by Europeans in 1688 inhabiting the country between the Cape and Natal. The Kaffirs are a fine, tall, muscular, intelligent race, rather of a vain and generally indolent disposition. They are an agricultural and pastoral people, but also manufacture articles in wood, iron, and fiber. Superstitious tales take the place of religion.

Products.—The colonists are chiefly employed in the production of wool and wine; in the rearing of horses, cattle, sheep, and ostriches, and the culture of wheat, barley, oats, and maize. Valuable forests cover large areas, and are extensively worked. The waters around the coast abound in fish.

Minerals.—Copper mines exist in Namaqualand; the ores are of the richest, yielding 32 to 36 per cent. Gold is found in the Knysna district and manganese in the Paarl. Coal is also worked, the output being in 1908 122,855 tons; it is extensively used on the eastern system of railways. Diamonds are chiefly found in the district of Kimberley.

The external trade is considerable, a large proportion of the trade of the territories of South Africa being effected through the ports of the Province of the Cape of Good Hope. It is chiefly carried on in British and colonial vessels.

Ports.—The Province is destitute of natural harbors or sheltered anchorages for large vessels, with the exception of Saldanha Bay on the western coast, and Simons Bay, and to supply this deficiency large sums of money have been spent in constructing protective works; the harbor and docks at Cape Town, Port Elizabeth, and East London being the most important.

The principal ports and anchorages of the Province referred to in this work are: Table Bay, affording limited accommodation; and Simons Bay, in which is the naval establishment, where there is shelter for all classes of vessels.

Immigration flag—Description and use of.—A yellow flag having a black ball in the center has been adopted as the immigration flag at all ports within the Province. This flag (hoisted at the stay) by vessels arriving in port denotes that the examination of passengers by the immigration officer is being carried out, and that no person not provided with a permit, or duly authorized by the immigration office, is, under penalty, allowed on board that vessel.

Railways.—The railways in the Union of South Africa are mostly the property of the Colonial Government; in 1909 the total length was 3,671 miles, out of which 3,191 miles were owned and worked by Government; 132 miles owned by private corporations, but worked by Government, and 348 miles owned and worked by private companies. There are also 485 miles of privately owned railways in Bechuanaland and Rhodesia, which are worked by Government.

Through communication now exists with the interior, the centers of this service being Bulawayo (580 miles), Wankie, Victoria Falls (850 miles), Salisbury, Beira, Bloemfontein, Johannesburg, Pretoria (1,040 miles), Pietersburg, Durban, and Delagoa Bay.

The railways of the Province of the Cape of Good Hope consist of three systems: The western system (1,262 miles) starts from Cape Town, runs northeastward through Bechuanaland to Vryburg (774 miles), and has several branches to Sea Point, Wynberg, Simons Town, etc. The Midland system (1,124 miles) starts from Port Elizabeth and joins the western system at De Aar Junction (339 miles). It has branches at Nauwport Junction, 270 miles from Port Elizabeth, and at Norvalo Pont Bridge (329 miles from the same place), where the central South African Railway commences; also numerous other branches. The eastern system (666 miles) runs from East London to Bethulie Bridge (286 miles), whence a branch line to Springfontein connects it with the main line running through the Orange River State. It has various other branches.

Cape Town is connected with Simons Town, via Wynberg, about 20 miles; there is also a private line of $3\frac{3}{4}$ miles from Cape Town to Sea Point.

The Cape Copper Co. own and work a mineral line from Port Nolloth to Vokeip, a distance of 92 miles.

Roads are numerous and unmetaled except in or near large towns. Progress over them in the wet season is naturally slow in consequence.

Telegraph.—In 1908 the Province had 31,836 miles of telegraph lines and 5,751 miles of telephone lines open. The Province of the Cape of Good Hope, Natal, the Transvaal, Delagoa Bay, British Bechuanaland, Buluwayo, and Fort Salisbury are connected by telegraph. The connection also continues to Beira, Tete, Chinde, Blantyre, Fort Johnson, and Karonga, situated at the northern end of Lake Nyassa. Abercorn and Kituta and Ujiji on Lake Tanganyika.

Submarine cables.—Cape Town is connected with England by two lines of cable on the western side of Africa and by one on the eastern side.

One of the western cables is connected with Swakopmund (Walfisch Bay), Mossamedes, Benguela, Loanda, and San Thome Island; whence lines run to Libreville (Gabon River), Princes Island, Bonny, and the Kamerun River; also to Kotonu, Akkra, etc., in the bight of Benin; thence, to Sierra Leone and England. The alternative route is via St. Helena and Ascension to St. Vincent, one of the Cape Verde Islands; and thence by two separate cables to Madeira and England and to Lisbon.

The eastern route is by overland wires to Port Natal. Port Natal is connected by cable with the more important ports on the eastern coast of Africa, Europe, and England, and also with west and south Australia.

Communications.—Mail steamers of the Union-Castle Line depart from Southampton for Cape Town every Saturday, calling only at Madeira, the passage from England to the Cape occupying 17 days. Intermediate steamers of this line also leave Southampton every Saturday for Cape Town, calling alternately at Las Palmas and Teneriffe (passage 21 days); and an extra vessel, in connection with Hamburg and Antwerp, departs from Southampton for the Cape once a fortnight (Wednesdays), calling at Lisbon and Madeira en route (passage 23 days). There is mail communication every four weeks between Southampton and St. Helena by the Union-Castle intermediate steamer; the homeward-bound vessel from Cape Town calls every four weeks, both at St. Helena and Ascension.

On the 5th of each month German steamers of the Woermann Line leave Hamburg for Swakopmund, Walfisch Bay, and Luderitz; the traffic between these ports, Port Nolloth and Cape Town, is carried on by a four-weekly service in connection with the Union-Castle Line. The Deutsche Ost-Afrika Line despatch four-weekly steamers from

Hamburg via Lisbon and Las Palmas to Cape Town by the western route, which proceed thence via the East African ports and the Suez Canal back to Hamburg. Another four-weekly service takes the opposite route, the vessels returning home from Cape Town without calling at any of the west coast ports.

Standard time.—The standard time used in the Province of the Cape of Good Hope is that of the meridian 30° east, or 2 h. 0 m. fast on Greenwich mean time.

Besides the Belgian Kongo, the standard time of the meridian of 15° east, or one hour fast on Greenwich mean time, is now adopted in French Equatorial Africa, Angola, and German Southwest Africa.

Princes Island and San Thome Island use Greenwich mean time.

Government dockyard.—There is a dockyard at Simons Town belonging to the Imperial Government.

Docks—Patent slips.—There is a floating dock with a lifting power of 1,300 tons and a small dry dock at Loanda.

An important Government dock is under construction at Simons Town, and Cape Town is provided with a dock suitable for large vessels.

There are patent slips at Port Nolloth, Cape Town, and in the dockyard at Simons Town.

Lloyd's signal stations.—There are Lloyd's signal stations at Ascension and St. Helena, and also at Cape Point, Cape of Good Hope; the last named is connected with the telegraph system of the Province of that name.

Radio.—Radio stations are established as follows:

German West Africa: Duala.

Spanish West Africa: Santa Isabel (Fernando Po).

French Equatorial Africa: Black Point.

Belgian Kongo: Banana.

German Southwest Africa: Swakopmund, Luderitz Bay.

British South Africa: Slang-kop (Cape Town).

Coal supply.—Coal to the extent of 500 tons or more is kept in stock at the undermentioned places, situated within the limits comprised by this book: Sikondi, Gkkassa, Lagos, Forcados, Libreville (Gabon River), Loanda, Cape Town, and St. Helena.

Coal in smaller quantities might be obtained at Mossamedes, Wal-fisch Bay, Luderitz Bay, and Port Nolloth.

The amounts generally kept in stock and facilities for coaling will be found under the headings of the several places.

Buoyage—Caution.—The positions, colors, and distinguishing marks of the buoys on the west coast of Africa may be generally considered as unreliable. Owing to changes in channels and shoals, the positions of the buoys require alteration from time to time, and those exposed to the sea or the influence of tidal streams frequently

break adrift. A buoy which has drifted from its moorings may seriously mislead, if assumed as being in position.

Effects of refraction.—Navigators should constantly bear in mind that the extraordinary refraction produced by the heated atmosphere along the whole coast of western Africa is a continual source of error, not only in observations for latitude, but also in those for chronometric longitudes, and one against which the greatest care should be exercised, as the altitudes of the sun, as taken, may be too little or too great. Observations made in the day should be verified by altitudes of stars and planets taken at night, or, better still, at twilight.

When making a landfall or endeavoring to recognize a headland by means of the latitude the same cause leads to a very serious deception, for this excessive and ever-varying refraction, sometimes amounting almost to a mirage, renders it difficult to make a correct estimate of the distance from the shore. In all cases the lead should be constantly used, as a bank of soundings of considerable breadth extends from most parts of western Africa. At times the distant shore will appear alarmingly close to the vessel, and at others the land when really near will appear removed to such a distance as to impose upon the most practiced and experienced eyes.

Sanitary precautions.—Special instructions, for the preservation of health, are issued for the guidance of officers and men employed in the rivers of the west coast of Africa. Many of these instructions, applicable also to those stationed on the coast, are given below:

(a) Only condensed water should be used for drinking purposes, but if, from any cause, it is not available and other water has to be used, it should be invariably boiled.

(b) Exposure to the sun and rain should be most carefully avoided, particular care being taken that neither the head nor the nape of the neck is left exposed to the sun's rays. Sleeping exposed to the night dews is dangerous, and sleeping on deck should be only permitted when under the protection of an awning.

(c) Wet clothes should be changed with as little delay as possible.

(d) It is strongly recommended to shift into night clothing, consisting of dry flannel or blanket, before sunset, also to wear abdominal belts made of two thicknesses of flannel both day and night.

(e) The use of carbolic acid or other approved disinfectants.

(f) As a rule, no white man should sleep on shore.

(g) It is important to health that all those who must keep on deck during a tornado should be in blanket dress; for, notwithstanding a high temperature, the rain numbs the limbs at the time, and a chill follows. If stoves could be lighted below for a couple of hours after

each tornado and on every day during the rainy season, it would conduce much to general health.

Winds.—Variable winds prevail in both hemispheres beyond the polar limits of the trade winds. In the North Atlantic Ocean, when the sun is in the Northern Hemisphere, the prevailing westerly winds are southwest and west-southwest; if, on the contrary, the sun is in the Southern Hemisphere, they are more frequently experienced from west-northwest and northwest.

There is a permanent high pressure area over a large portion of the South Atlantic, the barometer reading from 30.1 to 30.2 inches. In July and August this area extends right across from Africa to America between latitudes 20° and 35° south. Northward of the area the barometric gradients are very slight; southward of it they are much steeper. The wind revolves around this area against the hands of a clock, it being generally southerly on the eastern side, easterly on the northern side, northerly on the western side, and westerly on the southern side. Generally speaking, southward of latitude 35° south cyclonic gales traverse the ocean from west to east, causing a temporary interruption in the normal westerly winds above mentioned. These gales are more frequent from April to December, and more numerous farther south.

Trade winds.—The average polar limit of the northeast trade wind in the Atlantic Ocean extends to the parallel of 27° north, while that of the southeast trade lies on a line between the Cape of Good Hope and the islands of Trinidad and Martin Vaz, in about 20° south latitude. These limits vary about 3° north or south with the declination of the sun. The equatorial limits of these winds generally vary in the same manner; that of the northeast trade traveling from 12° north in August to 2° north in February, on the meridian of 26° west; while that of the southeast trade changes from 3° north to 1° north between the same months and in the same longitude.

The equatorial limit of the northeast trade wind verges, according to the season, more or less toward the Equator; but it seldom passes southward of it; the southeast trade wind, on the contrary, occasionally extends as far as 5° north. Between the equatorial limits of the northeast and southeast trade winds extends the belt or zone of calms and light airs named the "Doldrums." This zone is narrowest in February and broadest in August, averaging 100 miles in the former month and 300 miles in the latter.

When the sun is in the southern hemisphere, and at its greatest distance from the Equator, the direction of the northeast trade wind is more from the northward, and stronger winds are experienced than at any other time. If the sun be in the northern hemisphere the northeast trade is more from the eastward.

The most favorable time for crossing the line is from December to June, when the passage will be less interrupted by calms, squalls, and variable winds.

Sometimes the northeast and southeast trade winds meet, generally somewhere about the meridians of 28° or 33° west longitude, where a vessel may pass in a squall from one trade wind to the other.

Southwest monsoon.—In the Gulf of Guinea, as far north as Cape Palmas, the prevailing winds are southwest and southerly; between the latitude of Cape Palmas and that of Cape Roxo southwesterly winds prevail between June and September, and northeasterly winds during the other months of the year; in the latitude of Sierra Leone this southwest wind extends from the shore to longitude 32° west in the middle of the northern summer. During the fine season, land and sea breezes prevail with great regularity near the coasts and islands lying within the Tropics.

Harmattan.—Off the west coast of Africa, between Cape Verde and Cape Lopez, a very dry easterly wind, known as the “Harmattan,” sometimes blows in December, January, and February; it occasionally lasts five or six days, and has been known to continue as long as a fortnight, blowing with moderate force. It is always accompanied by a thick haze, which extends 12 or 15 miles from the shore.

From Sierra Leone northward its direction is from east; on the Gold Coast northeast by north; and at Cape Lopez north.

Tornadoes.—Tornadoes are violent gusts of wind peculiar to the west coast of Africa; they are of short duration, usually blow off-shore, and are generally more frequent at the commencement and termination of the rainy season. They are to be met with from Cape Bojador to the Kongo. Their approach is usually indicated by a well-defined and regular arch of clouds from which lightning and thunder constantly proceed; a dense white cloud in the center of the arch foretells a powerful blast.

During the lull which follows a tornado, and while the wind is resuming its usual moderate force (a period sometimes of three hours), a perpendicular stream of rain descends, and is attended by rapid peals of crashing thunder, with scarcely an interval between them, and by vivid forked lightning, which seems to proceed from all quarters at once.

Directions—Under sail.—In order to meet the first burst of a severe tornado, it is in general prudent to bear up from the indicated quarter—to furl all sails, including awnings, strike topgallant masts, bar imports and scuttles, and hoist the forestaysail, for it is essential that the vessel should not receive the first burst on her broadside.

At anchor.—If at anchor (the best condition in which to receive a tornado), furl awnings until the wind has expended itself; and

keep the forestaysail ready to cast the vessel in case of parting; then loose and slope awnings directly the wind ceases, in order to carry the succeeding deluge of rain to the waterways.

Kamerun River.—The following is compiled from three years' observations at Kamerun:

In the morning the winds are very variable in direction, seldom southwesterly, and of little or no strength. The afternoon winds are almost invariably southwest, drawing more westerly between December and March, and moderate or fresh breezes are frequently felt. Calms and light southwest winds prevail in the evening. Seven instances of greater strength than a fresh breeze are recorded. A strong breeze in March and a fresh gale in April, from northeast by north; strong breezes in March and May and a moderate gale in April, from east by north; and strong breezes in February and May, both from southwest by south. Most of these occurred in the evening.

Fogs are very common in the morning but are rarely experienced later in the day.

The Province of the Cape of Good Hope.—Near the coast of the Province easterly and westerly winds alternate. In summer easterly winds prevail; and in winter westerly winds. Southerly winds (southwest to southeast) prevail throughout the year in the northwestern part of the district (northwest of the cape), but they extend farther south in summer than in winter.

Weather chart.—A chart, showing the conditions of the weather, is exhibited, soon after 10 a. m. daily, for the information of masters of vessels and others, at each of the seaports of the Province of the Cape of Good Hope.

Atmospheric pressure.—In the intertropical regions the barometric range varies from 0.4 to 0.2 inch, and in the neighborhood of the Equator seldom exceeds 0.15 inch, this small change being due in great part to a regular diurnal variation. The average movement of the barometer within the Tropics being thus confined within small limits, any interruption of the law may be deemed a warning of the approach of bad weather. The fall of the barometer in hurricanes ranges from 1 to 2, and even $2\frac{1}{2}$ inches; the rapidity of the fall and the depression of the mercury increases as the center of the storm approaches.

In the northern hemisphere the effect of the veering of the wind on the barometer is according to the following law:

With east, southeast, and south winds the barometer falls.

With southwest winds the barometer ceases to fall and begins to rise.

With west, northwest, and north winds the barometer rises.

With northeast winds the barometer ceases to rise and begins to fall.

In the Southern Hemisphere:

With east, northeast, and north winds the barometer falls.

With northwest winds the barometer ceases to fall and begins to rise.

With west, southwest, and south winds the barometer rises.

With southeast winds the barometer ceases to rise and begins to fall.

The connection between the height of the barometer and the direction of the wind, according to a law discovered by Prof. Buys Ballot, and bearing his name, is expressed in the following rule: "If the face be turned to the wind the low barometer will be on your left hand."

This rule applies to the Southern Hemisphere, but must be reversed in northern latitudes.

Seasons and weather.—As a rule, the rainy season on that part of the coast north of the Equator commences when the sun crosses the zenith from south to north, and terminates when it recrosses the zenith, the remainder of the year comprising the fine season.

Southern side of the Bight of Biafra.—April and May are the season of calms, and tornadoes, which are frequent, blow from the eastward. At the end of November storms are of frequent occurrence, and abundant rain falls sometimes for several days in succession. During December, January, and February (the fine weather season) the Harmattan prevails, and though not continuous throughout this period, it occasionally blows for several days without intermission.

Generally it may be said that the seasons, as far south as the Gabon River, are similar to those in the Bight of Benin.

Gabon River.—Although it has been assumed that in the Gabon there are two dry and two wet seasons, it would be difficult to assign a limit to either, for the weather is undoubtedly very variable, and rain is more or less abundant throughout the year. What by comparison is termed the dry season lasts from June to September, during which period the heat is intense, although the sun is generally obscured, and the place is rendered unhealthy by miasmatic exhalations from the ground.

The rains commence toward the end of September and continue until the end of January, the greatest fall occurring during the latter half of this period; from February to May, inclusive, fine weather and rain alternate.

Thunderstorms, though of short duration, are very heavy, and are accompanied by heavy rain. As a rule, if one month be bad the next is comparatively fine. January has the reputation of being the most unpleasant month in the year.

From the Equator to latitude 10° south the rains generally begin in September and continue until the end of April. Southward of latitude 10° south there is occasionally no rain for several years in succession, but sometimes during the months of November and December it falls in excessive quantities, and parts of the country become almost inundated. For instance, no rain fell near Benguela during the years 1840, 1841, and 1842, but the appearance of immense watercourses, in which were large trees, that the torrents must have brought many miles from the interior, amply testify to the occasional floods.

On the subject of the seasons, an officer of the French Navy observes: "One general remark to be made on the seasons of this portion of the coast is, that they are found to be more backward as an advance is made to the southward. Every time the sun, in its alternate passage from one hemisphere to the other, passes the zenith of the place, this period is generally that of the bad season of rains, squalls, and storms. In places near the Equator these passages occur every six months, and therefore during the year there are two rainy and two dry seasons; the former when the sun is in the zenith and the latter when it is at its greatest distance from the Equator north or south. This rule, however, is not to be considered absolute, for in parts near the Equator, what may be called the dry season, is that in which rains are less heavy or continuous than at other times, while the season subject to storms and tornadoes has its intervals of fine weather."

The quantity of rain which falls in the southern latitude bears no proportion to the wet seasons north of the Equator, and this becomes apparent by the aspect of the coast, which southward of the Fernand Vaz River, changes from the luxuriance of the shore north of the Equator to the brown-looking and often bare and arid downs, which then begins to characterize the scenery. About Cape Lopez fair weather can not be expected before the middle of May.

On the coast northward of Loango the rainy season commences in September and continues through October, November, and part of December; this is followed by the hot weather, which extends to the end of February. From the latter part of June to the end of August is the dry season. Tornadoes and storms prevail throughout March, April, May, and the beginning of June, and are also experienced in September and October.

On the southern part of Loango and around the Kongo River the rainy season (Massanga) usually begins in October, although sometimes it is retarded until November, or even December, and terminates in January, when the harvest months of great heat (Neasu) succeed, and continue until March or April. Then follows the tornado season (Quitombo) during May and June; and after-

wards the dry season prevails until September. It is during this latter season that fogs of a dense character prevail.

The months of March and April are the most unhealthful, and this is owing to the exhalations from the earth after the heavy rains, which the light sea breezes are not sufficient to dispel. From May to September is the most pleasant and healthful part of the year; the sky during this period is generally overcast, and in the months of June, July, and August a thick fog, called the "Smokes," prevails, which is not caused by exhalation, and is neither unwholesome nor unpleasant.

Tornadoes occur in September and October as well as in May and June; they generally blow from the east-southeast, but are not so violent as those northward of the Equator. Altogether, the weather south of the Equator is much pleasanter than that to the northward. The breezes are always moderate, the water is smoother, and tornadoes, though generally accompanied with lightning, thunder, and very heavy rain, are not so violent; a quarter of an hour may be considered the average duration of the wind, but the rain lasts some time. After a tornado the winds are variable, and sometimes veer round the compass in 24 hours. In or about the parallel of the Kongo River these tornadoes cease.

The seasons in the Kongo change almost to the day every year, viz, between May 13 and 17. The last fortnight or so is invariably the worst, with very heavy rains, and without tornadoes, changing to continuous fine weather within the above dates.

Kongo River to Great Fish Bay.—From May to November may be considered the fine season; during this period, particularly from the middle of June until early in October, beautiful bracing weather is experienced, though at times heavy dews fall, particularly in July.

June to September is the harvest season, when the rains have fallen in the ordinary time.

The hot season commences in November, and lasts till the end of April. This may be considered the sickly and the rainy season, most rain falling during February and March; but south of St. Phillips Bonnet, Benguela, frequently a season passes without any hazy weather like smokes in the Bight of Benin.

At Mossamedes from about August 25 to September 10, it has been found difficult to get observations for time, either by night or day, it being the Cacimbo season, or season of damps and clouds.

Great Fish Bay to Possession Island.—The medium temperature of the air in the neighborhood of Luderitz Bay is about 63°, and at Walfisch Bay 66°; but the temperature is invariably 4° or 5° lower on the coast than out at sea. The barometer on this coast ranges from 29.9 to 30.2 inches.

In the summer season, when the weather is calm and the sky without a cloud, the sun is very powerful; but, generally speaking, and more especially during the prevalence of the southerly winds from August to May, the temperature is moderate. These southerly winds are stronger in proportion as the south latitude increases. Thick woollen clothing is then required, for the wind is at times keen. The temperature does not vary much, averaging during the year in the shade 50° to 60° .

On all this coast it seldom rains. The dews, however, during the nights are heavy, and thick fogs in the winter season saturate everything with moisture. After one of these fogs, water will frequently drip heavily from the rigging.

Possession Island to Cape St. Martin.—The seasons on this part of the coast are not well defined. In the months of May, June, July, and August rain rarely falls; but during the remaining months of the year rain is occasionally experienced and sometimes extends over several days, especially between September and March.

The Province of the Cape of Good Hope.—The rainy season in the western portion of the Province, as far eastward as Cape St. Francis, is during the winter, the rains being due to the westerly winds from the Atlantic; but there is a fair proportion of fine weather even in that season. Smart showers begin about March, increasing gradually up to June, then decreasing in like proportion until October. December, January, and February are dry months. The summer may be said to commence in November and end in April.

Currents—Guinea Current.—The Guinea Current is a current running to the eastward along that part of the African coast comprised chiefly between Cape Roxo and the Bight of Biafra, extending southward to the third and second parallels of north latitude. Its western limits can be traced at all seasons of the year as far as the twenty-third meridian of west longitude, but in the summer and autumn months (July to November) an easterly current extends as far west as the meridian of 53° west; this is probably an expansion of the Guinea Current proper, or a counter Equatorial Current.

The greatest velocity of the Guinea Current is experienced off Cape Palmas and between it and Cape Coast Castle. In the month of June it sometimes attains the rate of 85 miles a day. The space separating the Guinea and Equatorial Currents is generally limited, thus presenting the remarkable feature of two well-defined streams running in exactly opposite directions side by side. Their courses continue thus parallel to each other and to the land for above 1,000 miles; and according as a vessel, wishing to proceed along the coast in either direction, is placed in one or the other current will her progress be aided from 40 to 50 miles a day or retarded to the same amount.

The temperature of the Guinea Current is generally above 80° at all seasons of the year, except in August, when it is below.

In the harmattan season (December to February) the Guinea Current near the land in the Bight of Benin is checked, and inshore a westerly set is felt. Heavy tornadoes have a similar effect in checking the Guinea Current.

Equatorial Current.—The Equatorial Current in its course between the continents of Africa and America may be considered as a drift of water forced from a cooler region by the southeast trade wind. It may be said to commence in the neighborhood of Annobon or immediately south of the Equator, between the second and eighth meridians of east longitude, although from this locality a continuity of the northerly drift along the coast of South Africa, as well as from the Kongo River, may be traced. The surface temperature in its eastern part is several degrees colder for a great part of the year than the adjacent Guinea Current, affording evidence of receiving waters from a colder source.

The Equatorial Current appears to attain its greatest volume and velocity during the season of the northern summer. From the African coast to about the fifteenth degree of west longitude the maximum strength, 85 miles a day, has been observed in May and June, and during this period its direction is more regular, being west. Westward of that meridian, at successive later periods, or between July and October, it is probably subject to irregularities in strength, depending on the winds.

The northern boundary, or rather, the definite line of separation between it and the Guinea Current, has been well traced in the space extending from the meridian of Greenwich to longitude 23° west and is found to vary little at the several seasons of the year. For example, on the twentieth west meridian the line of separation in October and November is in latitude 5° north, in March and April in 2° north. In the fifth degree of west longitude the line of separation appears to be generally constant in latitude 2° north, and the current has a northwest direction.

Approaching the African coast, Annobon Island is considered to be at all seasons in the Equatorial Current, Princes Island in the Guinea Current, and San Thome (St. Thomas), situated nearly midway between the two, as within the influence of one or the other current, according to the season.

From Annobon Island to the meridian of 15° west the following are the average surface temperatures of the Equatorial Current:

| | | | |
|----------|------------|----------|------------|
| May | 83° to 78° | August | 78° to 68° |
| February | 80° to 81° | November | 79° to 77° |

Westward of the fifteenth meridian the surface temperatures at the several seasons lessen materially in their annual range, and the Equatorial Current gradually loses its earlier features of being a cold-water stream at one particular season of the year.

South African Current.—The current along the western coast is formed by the cold waters flowing from the higher latitudes of the South Atlantic, and that portion of the Agulhas Current which rounds the Cape of Good Hope; and then as an amalgamated stream, sets alongshore to the northward as far the Kongo, at the average rate of 1 mile an hour, its direction inshore being influenced by the trend of the coast. Northward of Mouta Secca Point its velocity is increased by the stream of the Kongo River mingling with it, which, lessening in velocity as it extends seaward, runs with almost undeviating regularity to the west-northwest and northwest, and maintains a rate of about 2 miles an hour, as far as Cape Lopez, whence the main body takes a westerly course and becomes absorbed in the Equatorial Current, about 2° or 3° south of the Equator; while the remaining portion, after passing Cape Lopez, appears to set toward Cape St. John, and thence following the sinuosities of the coast, continues as far as the Kamerun River where it intermingles with the tail of the Guinea Current. From January to April the current appears occasionally to run to the southward, close inshore, between Kamerun River and the Equator.

The British naval vessel *Rambler*, when proceeding from Fernando Po to Loanda April 2 to 9, 1899, found that from about latitude 2° north the current ran invariably to the west-northwest at the rate of about 1 knot an hour; the color of the sea was a dark olive green, getting browner and more like peat water as the Kongo was approached, after passing which it was of normal deep sea blue green. The temperature of the sea was almost invariably about 2° higher than the air, the lowest observed 80° (air 81°), and the first occasion on which the temperature of the water fell below that of the air, being at 8 p. m. on the 7th in latitude $5^{\circ} 35'$ south, just before passing out of the Kongo stream.

The density fell on April 7 until it reached 12 at 8 p. m., rising again to 22 at midnight. From latitude $5^{\circ} 20'$ south to $5^{\circ} 50'$ south numerous patches of scum and strong rippings, affecting the steerage of the ship, were passed through; when to the southward of the Kongo, rippings were also observed, as well as patches of drift rubbish.

Kongo Stream.—This stream is felt a considerable distance from the coast and imparts a clayey appearance to the water, which is of a yellowish olive-green color.

At the distance of 9 miles to seaward the surface water is still quite fresh; at the distance of 40 miles it is only partially mingled

with that of the sea, while the discoloration caused by the fresh water has been known to extend 300 miles off, where the current also has been reported to be perceptible, so that ships going north or south should be prepared to make allowance for it.

While passing through the Kongo Stream, 60 miles from the land, the British naval vessel *Magicienne*, January, 1898, found that the temperature of the air fell 4° and that of the sea 3° , the density of the water decreasing from 10 to 7. The current that day set the ship north 12 miles.

ROUTES.

England to the Cape of Good Hope—Full-powered steam route.—As direct as possible. Give a wide berth to Ushant and Cape Finisterre (remembering that the current from the Atlantic sets right on to the coast), and thence steer direct for and through the Canary Islands and proceed along the coast of Africa, skirting, as near as circumstances will permit, the shoals off it until well below Sierra Leone, when cross the Equator in about longitude 9° west and steer direct for the Cape.

The following places where coal can be obtained are in the track mentioned above, or nearly so: Vigo, Lisbon, Madeira, Las Palmas, Sierra Leone, and St. Helena.

Another route for the outward-bound vessel, when past Sierra Leone, is to continue along the coast of Africa as far as Cape Palmas and then steer for the Cape, the course crossing the Equator in about longitude 2° west and curving in toward the coast. The distance by this route would be 6,000 miles, but the vessel would be able to call at the Kongo or Loanda for coal.

Sailing route.—A vessel on leaving the English Channel should at once make westing, as the prevailing winds are from that direction.

With a fair wind from the Lizard, a 230° course should be steered to gain an offing in longitude 11° or 14° west.

If the wind should be from the westward keep on the tack which enables most westing to be made to get a good offing, and keep clear of the Bay of Biscay, even standing to the west-northwestward until well able to weather Cape Finisterre on the starboard tack. By making a long board to the westward nothing is lost, as the wind will generally be found to veer, so that a change of wind will be favorable, and even permit a vessel to pursue a course with a free wind; while if embayed in the Bay of Biscay, any change of wind to the westward would necessitate beating to windward against the current.

A vessel from Liverpool should pass north or south of Ireland, as most convenient, considering the direction of the wind at starting.

In passing Cape Finisterre, give it a wide berth, as the current from the Atlantic usually sets right onshore there.

From longitude 11° or 14° west a course should be shaped to pass Madeira at any convenient distance. This island may be passed to the eastward or westward, but in the winter months it is preferable to pass westward of it, for the strong westerly gales which occur in November, December, and January produce eddy winds and heavy squalls eastward of the island.

From Madeira pass to the westward or just in sight of the Cape Verde Islands.

In considering where to cross the Equator it is necessary to bear in mind that if a vessel crosses far to the westward there will be a less interval of doldrum to cross, but it may be requisite to tack to weather the coast of South America, and these crossings vary during the year, as the direction of the southeast trade wind is more southerly when the sun is north of the Equator than when south. The following is the result obtained by the Hydrographic Office after examining the logs and journals of many ships:

After passing the Cape Verde Islands: From January to April stand to the southward on about the meridian of 26° west, and when the southerly winds are met with keep on the tack which gives most southing and endeavor to cross the Equator not west of longitude 26° to 28° west.

In May do not cross west of longitude 26° west.

In June and July, when the southerly winds are met with (probably in latitude 6° north in June and 10° north in July), keep on the starboard tack, so long as any southing can be made, until a fair amount of easting has been secured, and cross the Equator in about 23° or 25° west.

In August the requisite easting should be made with the first of the south-southwesterly winds, in about 10° or 12° north, and the Equator crossed in about 23° west.

In September proceed as in August, but cross the Equator in about 24° west.

In October, also as in August, but the southerly winds will first be met in about 10° or 9° north, and the Equator should be crossed not west of longitude 25° west.

In November and December the trades hold good to 5° or 6° north, cross 25° west in about 6° north, and then take the tack which gives most southing, and cross the Equator not west of 28° west.

The Equatorial Current is not so strong in the northern winter as in the summer and autumn months; but the mariner must remember that the strength of the current increases as it advances toward the American coast.

Equator to the Cape.—Having crossed the Equator as recommended, a vessel should stand across the southeast trade wind on the port tack, even should the vessel fall off to southwest by west, for the wind will draw more to the eastward as the vessel advances, and finally to east by north at the southern limit of the trade. When in the vicinity of St. Paul Rocks, astronomical observations should be frequently made, the current watched and allowed for, and a good lookout kept, as these rocks are steep-to, and can only be seen on a clear day from a distance of 8 miles. The same precautions are necessary if passing westward of Fernando Noronha, when approaching that dangerous reef, the Rocas, from which a light is shown. Vessels, in proceeding to the southward in the southeast trade, generally sight the island of Trinidad to test the rate of their chronometers, and to take a fresh departure. During the greater part of the year the southeast trade fails on a line drawn from the Cape of Good Hope to the islands of Trinidad and Martin Vaz. This limit varies about 3° off Trinidad and about 9° off the African coast, according to the position of the sun.

A vessel, when to the southward of the southeast trade, will meet with fresh winds variable in direction. Those from north-northeast through north to west-northwest, if accompanied by cloudy weather, often shift suddenly to south-southwest or south, but sometimes the wind steadies between west-southwest and southwest. From Trinidad Island a course should be shaped to the east-southeastward to cross the parallel of 30° south, in about longitude 26° west, but in the southern summer when passing well westward of Trinidad steer to cross 30° south in 20° west, and the meridian of Greenwich in about latitude 35° to 37° south, whence to the Cape of Good Hope winds from the westward and southward usually prevail. After passing the meridian of Greenwich, a strong northerly current will frequently be experienced; and on nearing the land, when bound to Table Bay, great attention is required, as there it will be found almost constantly running strongly to the northward, and, if disregarded, a vessel may have difficulty and lose time in reaching the bay. If bound to Simons Bay during the southern summer months, it will be better to make the land about Cape Hangklip, as a strong current sets at that period across the entrance of False Bay toward Cape Point.

Vessels approaching the Cape of Good Hope from the westward will, if the weather be clear, make Cape Point Light at the distance of about 36 miles, except between the bearings of 125° and 119° , when it is obscured by Vasco da Gama Peak. Caution is therefore necessary not to continue a course between these bearings when making the land at night, or in hazy weather, but to steer so as to cross

the darkened region with as little delay as possible. By using this precaution, there is little danger to apprehend from the light not being visible on this small sector of space.

Should a vessel be near the coast at night and the land not visible, she should be kept to the south-southwestward until her position is ascertained.

As the wind seldom, if ever, blows from the east or northeast (*i. e.*, directly off the peninsula), sailing vessels bound either for Table Bay or round the Cape of Good Hope, should insure a weatherly position to the north or south, according to the season of the year. Those for Simons Bay has been detained many days by southeasters off the Lion's Head and Hout Bay, in consequence of their making the land too far to the northward during the summer season. The same winds would have been fair for them had they been 30 miles farther south. On the other hand, a vessel bound for Table Bay in the winter season will find it difficult to make her port from a position off Cape Point, during the continuance of north and north-westerly winds, notwithstanding the general prevalence of a north-west current.

Caution.—Under any circumstances, at night, there is great difficulty in judging the distance of lights situated under high land. Therefore, the prudent course for a stranger to pursue when making Table Bay is to keep off and on until daylight, sufficiently to the westward of Green Point to prevent being becalmed near the land and set in upon the coast by the heave of the sea.

Cape of Good Hope to New Zealand.—The track across the southern Indian Ocean adopted by the principal steamship companies crosses the meridian of 40° east in $43^{\circ} 10'$ south, 100° east in 47° south, and 120° east in $46^{\circ} 20'$ south.

Cape of Good Hope to England—Full-powered steam route.—The reverse of the outward route.

Sailing route.—A good offing should first be obtained to the northwestward, as squalls from this quarter are not unfrequent near the coast, and have been experienced in both seasons. Then a course should be shaped for St. Helena, and in cloudy weather get on to its parallel some distance to the eastward of it, to avoid missing it, if going to call there.

From St. Helena a direct course may be steered to cross the Equator in about 24° west longitude. Then a northerly course should be made to reach the northeast trade as soon as possible (in July and August crossing latitude 10° north westward of longitude 26° west), and run through it. The trade wind will probably be lost in about 29° to 30° north, and from 36° to 40° west, when westerly winds may be expected, and a course shaped for the English Channel.

It is seldom advisable to pass eastward of the Azores, but should the wind draw to the northwestward when near them, the most convenient channel through them may be taken.

If easterly winds are experienced after passing the Azores, the vessel should still be kept on the starboard tack, as westerly winds will probably be sooner found.

Cape of Good Hope to Montevideo—Full-powered steam route.—Follow the rhumb line.

An alternative route is to follow the rhumb line to Rio de Janeiro as far as 20° west, and then that to Montevideo. The distance is only 180 miles longer than the other, but this would probably be more than made up by lighter winds and favorable currents.

Low-powered steam and sailing route.—Keep well within the southern limit of the southeast trade until nearing Trinidad Island, and thence direct.

Montevideo to the Cape of Good Hope—Route for all vessels.—Steer to cross 25° west in about 41° south, except in winter, when a rhumb should be taken to near Gough Island, thence great circle to cape.

Sierra Leone to the Bight of Biafra—All vessels.—After rounding St. Ann Shoals keep along the coast as far as Cape Palmas and thence go direct.

Sailing vessels should be careful not to get to leeward of their port.

Coal can be obtained at Akassa and Lagos.

Bight of Biafra to Sierra Leone—Full-powered steam route.—The reverse of the above.

Sailing vessels.—From the northern part of the Bight of Biafra (where the principal oil rivers are) vessels should stand south and, if possible, pass to the westward of Fernando Po, and cross the Equator as soon as possible, unless the vessel can lie up as high as west. When southward of the Equator, stand to the westward in the Equatorial Current, and as westing is made the wind will be found to back gradually around to the east-southeastward. When in about longitude 10° west, the Equator may be recrossed and a course shaped for Sierra Leone.

Bight of Biafra to England—Full-powered steam route.—Direct to Cape Palmas, then along the coast of Africa, through the Canary Islands, and past Cape Finisterre for the English Channel.

Sailing route.—Stand to the southward of the Equator into the Equatorial Current and then make westing, as from the Bight of Biafra to Sierra Leone. Recross the Equator in about longitude 20° west and then, as from the Cape of Good Hope, run through the northeast trade and shape a course for the English Channel.

Ascension to the coast of Africa—Full-powered steam route.—Direct both ways.

Sailing route.—From Ascension a sailing vessel should, on the starboard tack, fetch the coast of Africa in from 13 to 15 days, but at various points, from Cape Lopez as far to windward as Loanda, or even farther to the southward, according to the season of the year. In the month of May the wind hangs to the eastward all the way over and a vessel will not weather Annobon Island; generally, however, a good sailing vessel, carrying a press of sail, will fetch to windward of the Kongo.

Two precautions are, however, requisite; first, not to go to the northward of latitude 3° or 4° south; secondly, not to bring the port of destination to bear to the southward of southeast by south; an occasional short tack, as the wind backs a little, may therefore be necessary, but the whole passage may sometimes be made with a free wind.

Bound to the Cape of Good Hope, run through the trade on the port tack and then proceed as from England to the Cape.

Bight of Biafra to Ascension—Full-powered steam route.—Direct.

Sailing route.—Stand to the southward on the starboard tack, generally weathering San Thome Island, as far as the Equator; then stand to the westward, taking care to keep in the Equatorial Current. Nothing will at first be made, but the vessel will be pretty sure to come up as she proceeds to the westward.

From Cape Coast Castle a vessel should also stand across the Equator on the starboard tack, and then as above.

For vessels from the coast, south of the Equator, the winds are always favorable, gradually backing from south-southwest to east-southeast as the island is approached.

St. Helena to the coast of Africa—Full-powered steam routes.—Direct.

Sailing routes.—Vessels will generally fetch as far to the southward as Benguela, except in May, when the southeast trade has more easting in it and the lee current is strong. To all places northward of Benguela, therefore, the winds are favorable. They veer round from east-southeast to south and south-southwest as the coast is approached.

Coast of Africa to St. Helena—Full-powered steam routes.—Direct.

Sailing routes.—From places north of the Equator, vessels should keep in the Guinea Current until in the Bight of Biafra, and then work along the coast as far as the Kongo River, from whence there

will generally be little difficulty in reaching St. Helena by keeping on the port tack. From Cape Palmas a vessel on the starboard tack will generally reach Cape Lopez and often south of Annobon.

To the southward along the coast of Africa—Full-powered steam route.—Direct.

Low-powered steam route.—Direct along the coast, coaling if necessary at the Kongo, Loanda, and Port Nolloth; or, if bound to the Cape of Good Hope, stand out and run through the trade and approach the Cape as from England.

Sailing route.—Along the whole shore of the Bight of Biafra vessels may work to windward with the land and sea breezes, anchoring when necessary to prevent being set northward by the current, especially during April and May, the season of calms and tornadoes.

From Cape Lopez to the Kongo a vessel should maintain a good offing, only approaching the shore to take advantage of the land breezes, which begin to blow at or a few hours before sunrise. In February and sometimes in October, the sea breeze is so well to the westward as to enable vessels to lie along the coast on either tack, but during May the wind blows steadily along the coast from south-southeast and southeast by south, night and day, with a northerly current of 1 knot an hour.

To cross the Kongo stream either keep 200 miles off the coast or keep in anchoring ground, the latter preferred. The usual course is to beat alongshore as far as Red Point (latitude $5^{\circ} 44'$ south, longitude $12^{\circ} 08'$ east) (the northern point of the Kongo estuary), keeping on the bank of soundings in order to anchor if the wind falls light, and stretching across when the sea breeze has well set in.

From the Kongo to Loanda vessels should anchor every night when the sea breeze falls light, so that they may weigh with the first of the land breeze and continue on the port tack until about 1 p. m., when they should tack, and by the time the sea breeze fails good progress will have been made to the southward.

From Loanda to Great Fish Bay, when in the neighborhood of Palmerinhas Point, as the current sets to the northward with considerable force, a good stretch off the land for 50 or 60 miles will enable the vessel to weather the point; it seldom answers to work alongshore. Do not get away from the land more than 50 or 60 miles, as beyond these limits the sea breeze declines in force and draws more to the southward, which would necessarily cause a loss of ground on the inshore tack, besides which the advantage of the alternate land and sea breezes, which are almost invariably experienced closer inshore, would be lost.

To the southward of Cape Negro there is no difficulty in working to the southward if due advantage be taken of the variations of the

wind, and the tacks arranged accordingly. As rollers are frequent, the shore must be given a good berth. To the southward of Cape Frio northerly winds may be expected from May to August.

If going to the Cape of Good Hope, stand off and run through the trade, and approach the Cape as when bound from England.

Steering commands.—The system of steering commands, in which the terms starboard and port signify that the vessel's head is to go to starboard and port, and not the helm, have been adopted by France, Germany, Portugal, and Spain.

Pilot vessels—Lights.—Pilot vessels, when engaged on their station on pilotage duty, shall not show the lights required for other vessels, but shall carry a white light at the masthead, visible all around the horizon, and shall also exhibit a flare-up light or flare-up lights at short intervals, which shall never exceed 15 minutes.

On the near approach of or to other vessels they shall have their side lights lighted, ready for use, and shall flash or show them at short intervals to indicate the direction in which they are heading, but the green light shall not be shown on the port side, nor the red light on the starboard side.

A pilot vessel of such a class as to be obliged to go alongside a vessel to put a pilot on board, may show the white light instead of carrying it at the masthead, and may, instead of the colored lights above mentioned, have at hand ready for use a lantern with a green glass on the one side and a red glass on the other, to be used as prescribed above.

A steam pilot vessel, exclusively employed for the service of pilots licensed or certified by any pilotage authority or the committee of any pilotage district, when engaged on her station on pilotage duty and not at anchor, shall, in addition to the lights required for all pilot boats, carry at a distance of 8 feet below her white masthead light a red light, visible all around the horizon, and of such a character as to be visible on a dark night with a clear atmosphere from a distance of at least 2 miles, and also the colored side lights required to be carried by vessels when under way.

When engaged on her station on pilotage duty and at anchor, she shall carry, in addition to the lights required for all pilot boats, the red light above mentioned, but not the colored side lights.

Pilot vessels, when not engaged on their station on pilotage duty, shall carry lights similar to other vessels of their tonnage.

CHAPTER II.

CAPE PALMAS TO CAPE THREE POINTS.

Cape Palmas, 13 miles westward of the eastern boundary of Liberia, is a rocky peninsula joined to the mainland by a low sandy isthmus. The highest part, 74 feet above high water, is near the middle of the cape. On its eastern extremity is Grand Town, consisting of a number of native houses, and on the remainder of the peninsula is a settlement named Harper, the white houses of which are conspicuous when seen from the eastward.

Communication.—The steamers of Elder, Dempster & Co. call at Cape Palmas three times a month, outward and homeward.

Caution.—The cape should be approached with caution, as a mirage generally hangs about and over the land, making bearings of definite objects difficult to obtain.

Light.—A fixed white light, 98 feet above high water, and visible 3 miles, is shown from a white circular stone tower, 51 feet high, on Cape Palmas. This light is unreliable.

On account of the unreliability of Cape Palmas Light, which is visible not more than 3 miles, the agents of the Woerman Line of steamers have established a fixed white light, visible 11 miles, on the roof of a square white building, with balconies on all sides, located on the highest point of Cape Palmas, 275 yards 64° from Cape Palmas Light. This light, which is only exhibited when a steamer of the line is expected, is, therefore, not to be depended upon for the purposes of general navigation.

Hoffman (Palmas) River flows into the sea on the northern side of the peninsula of Cape Palmas; its entrance is about 100 yards wide, but there are several rocks in the channel. At low water a general depth of 3 feet was found on the bar, inside of which, as far as the surveying boats went, the depth seldom exceeded 1 fathom.

The rollers on the bar are occasionally heavy enough to prevent communication by ordinary boats.

Cape Palmas Rocks are three groups of rocks lying off Cape Palmas in a line about 250°; the eastern of these lies 200 yards from the cape and has 9 feet over it at low water; the middle rock, 400 yards from the cape, partially uncovers at low water; and Outer Rock, which lies about 1,050 yards 254° from the extremity of the cape, is very small and has a depth of 9 feet over it.

The soundings in the vicinity of these rocks are very irregular and the bottom is foul, but on either side of the inner rock there are channels with 3 fathoms of water. Between the large middle rock and Outer Rock there is a wide opening in which there is a depth of $4\frac{1}{4}$ fathoms. Strangers, however, should not attempt to use these passages, even when coming from the eastward and bound to Harper Anchorage, but should keep outside all, in not less than 14 fathoms.

Wrecks.—The wreck of the steamer *Yoruba* lies on the beach, 1,500 yards 341° from Cape Palmas, and forms a good mark.

A wreck, with one mast showing above water was reported in 1900 to lie 1.3 miles 307° from Cape Palmas.

Congo Rock lies 1.2 miles 274° from Cape Palmas Lighthouse. It is of small extent, and has a depth of $2\frac{3}{4}$ fathoms over it, with 5 fathoms close around and 7 fathoms 50 yards off.

This is probably the rock reported by the *Congo* in 1875 and by the *Volta* in 1879, but it lies farther to the northward than the position given by either of these vessels.

Anchorage.—The usual anchorage is off the western side of Cape Palmas in 6 or 7 fathoms of water, on a line between Rocktown Point and the cape, with the latter bearing 112° , distant 0.9 mile or farther in, with the cape bearing 153° , distant about 900 yards. Steamers sometimes anchor nearer the cape in 5 fathoms, but have to shift on rollers setting in.

Rocks.—**Yoruba Rock**, with a least depth of $3\frac{1}{4}$ fathoms over it, lies 1,100 yards 275° from the extremity of the cape. From the rock depths of from $3\frac{1}{2}$ to 5 fathoms extend about 200 yards in about northeasterly direction and 275 yards in an easterly direction.

Bull Rock, with 5 fathoms over it, lies a little over 1 mile 257° from the extremity of the cape.

Henderson Rock, with 4 fathoms over it, lies about $1\frac{1}{4}$ miles 225° from the extremity of the cape, and about 400 yards southwestward of Bull Rock.

Recorder Rock, with $4\frac{3}{4}$ fathoms over it, lies about 300 yards southward of Henderson Rock and 1.3 miles 250° from the extremity of the cape. These rocks are all surrounded by deep water and should be approached with great caution.

Depths of less than 5 fathoms extend about $\frac{1}{2}$ mile westward of the western end of Russwurm Island.

Brenton Rock, with a least depth of $2\frac{3}{4}$ fathoms over it, lies at the southwestern point of this bank, 800 yards 250° from the western extremity of the island.

Three Foot Rock, with a least depth of 3 feet over it, lies on the southern edge of this bank 400 yards 255° from the extremity of the island. A $2\frac{3}{4}$ fathom shoal lies 100 yards westward of Three Foot Rock with another 3-fathom shoal 150 yards northwestward of it.

Russwurm Island, named after the first governor of the American colony of Harper, is a small rocky island, nearly covered with grass and shrubs, on the southern side of Cape Palmas, and was formerly used by the natives as a burying place for their dead. It is nearly 600 yards long, with an average breadth of about 100 yards, and a rocky pinnacle on it rises 43 feet above high water. A rocky ledge, terminating in a large rock 13 feet above water, extends about 200 yards from its eastern end. About $\frac{1}{2}$ mile eastward of the island, and nearly $\frac{1}{4}$ mile from the shore of the mainland, there are some breakers with $4\frac{1}{2}$ fathoms of water close to their southern side.

Boat passage.—The channel which separates Russwurm Island from Cape Palmas affords a good passage to boats, provided they keep on the northern side of it.

Flat Mountain.—Northeast of Cape Palmas there is some elevated land, the highest part of which, Flat Mountain, 1,095 feet above high water, bears 358° from the cape, distant 25 miles.

Soundings.—The 100-fathom edge of the bank of soundings approaches Cape Palmas within 13 miles, the depth decreasing to 30 fathoms at a distance of 6 miles from the shore; and at $1\frac{1}{2}$ miles from the cape the depth is 15 fathoms.

The bank of soundings, under 10 fathoms, westward and southwestward of Yorbuah and Outer Rocks off Cape Palmas, has been closely searched for reported dangers, but without success.

Tides.—It is high water, full and change, at Cape Palmas at 4 h. 30 m.; springs rise 4 feet.

Current.—The current between Sierra Leone and Cape Palmas is influenced by the wind. Between May and October it sets northwestward with winds southward of southwest, and southeastward, with winds westward of southwest. When the breeze is fresh a current of at least 2 knots an hour may be expected. In November there is generally a current setting northwestward; from December to May a current setting southeastward, the latter at the rate of from 10 to 40 miles a day.

During the rainy season an easterly set of 3 knots an hour has been experienced at the distance of a few miles from the shore at Cape Palmas.

Lagoon.—A narrow stagnant salt-water lagoon extends 6 miles eastward from Cape Palmas, and appears to be supplied by a small river, which, except in the rainy season, has not power to break through the sandy barrier that separates it from the sea. The position of this occasional outlet is marked by a depression of the beach, and on each side of it there is a native village, the inhabitants of which, it is said, sometimes empty the lagoon by an artificial channel, in order to take the fish.

Athol Rock.—The beach eastward of Cape Palmas is steep-to, with one or two conspicuous masses of stone upon it. A rock, with 3 fathoms of water over it, bears 111° distant nearly $1\frac{1}{2}$ miles from Cape Palmas Lighthouse. A rock with a depth of 5 fathoms on it lies $2\frac{3}{4}$ miles 115° from the lighthouse and $4\frac{3}{4}$ miles 116° from the lighthouse is Athol Rock with $3\frac{1}{2}$ fathoms water over it. Its distance from the nearest shore is $1\frac{1}{2}$ miles, Growa Point bearing 73° . The sea is said not to break on Athol Rock, even with a heavy swell.

Helene Woermann Rock.—In August, 1905, the German steamship *Helene Woermann* struck on a rock with 9 feet over it, situated 5.6 miles 121° from Cape Palmas Lighthouse.

Vessels should proceed along this coast with caution, as the bottom is irregular, and there are several areas over which no soundings have been taken.

Growa Reefs.—The space between Cape Palmas and Growa Point, a distance of 7 miles in an easterly direction, is full of rocky heads, of too great a depth to bring a vessel up, except the three above described, but a long series of reefs, on which the sea breaks violently, extends nearly $1\frac{1}{2}$ miles southwestward from Growa Point, and no vessel should approach these reefs at night in a less depth than 15 fathoms. Two native villages are situated near the point.

There is a shoal, with a least depth of 5 fathoms over it, 2,440 yards 213° from the southwestern extremity of Growa Point, and a shoal, with a least depth of 3 fathoms over it, 3,150 yards 260° from the same point.

About 670 yards eastward of Growa Point a reef extends $\frac{3}{4}$ mile southward and terminates in a rock above water. Nearly a mile westward of Growa Point a large square stone house, painted white, standing on a hill, is a most conspicuous mark, and here there is a trader's house on a cliff at the water's edge.

Cavally Point, $1\frac{1}{2}$ miles eastward of Growa Point, and the southern extremity of this part of Africa, may be distinguished from the adjacent sandy shore by its black, rocky appearance; it is surrounded by reefs, extending 1,200 yards seaward. The village of Half Cavally stands on the point; there are also three factories and the large village of Cavally to the eastward. The most conspicuous objects at Cavally seen from the offing are two groups of cotton trees about midway between Cavally Point and Cavally River entrance. The next object to present itself is the French customhouse, a white building with a red roof and flagstaff, which stands on the shore at the eastern side of the river entrance.

Communication.—The African mail steamers call here when they have cargo to land, and they usually pass within signaling distance.

Supplies.—There are two trading firms here, and small bullocks, sheep, goats, and some poultry may be procured; but, as a rule, supplies are poor.

Cavally Rock.—About $1\frac{1}{2}$ miles eastward from Cavally Point there is a large rock above water near the outer extremity of a reef which extends about $\frac{1}{2}$ mile from the beach; other rocks above water rise from this reef within $\frac{1}{4}$ mile of the shore. About $\frac{1}{2}$ mile farther eastward is the commencement of a ledge of rocks fringing the shore for $1\frac{1}{2}$ miles, and extending generally throughout its length for a distance of $\frac{1}{2}$ mile from the beach. Sunken reefs lie close along the coast abreast of this ledge, and between them there is a narrow channel, in which there is a depth of $5\frac{1}{2}$ fathoms.

Cavally Ledge.—Between Cavally Point and Cavally River there is a large and dangerous ledge about 1 mile in length, in an easterly and westerly direction, the southern extreme of which rises suddenly from a depth of 10 fathoms, and extends thence toward the river. From the western extreme Cavally Point bears 277° , distant nearly 3 miles, and from the eastern extreme the mouth of Cavally River bears 50° , distant about $\frac{1}{2}$ mile.

Cavally River, the boundary between Liberia and the French colony of the Ivory Coast, enters the sea between two low sandy points about 4 miles eastward of Cavally Point. The entrance is about 100 yards wide, always open, with a channel which is continually shifting; the river within widens to the breadth of 1 mile, and here are three islands with rich plantations. The mouth of the river will not be seen until close in. A large village in which is a red house and several large trees are on the western entrance point, and on the eastern entrance point there is a group of tall palm trees, the village of Blieron, and the customhouse.

Cavally River is said to be navigable for small steamers for about 50 miles at high river and 43 miles at low river. Rowboats and canoes can ascend at all times as far as the first rapids, a distance of 80 miles. In January, 1897, the French gunboat *La Topaze* ascended the river for a distance of about 44 miles.

At a short distance seaward of the bar there are some detached rocks, with $4\frac{1}{2}$ fathoms of water close to the southward. Discolored water extends from 2 to 3 miles from the mouth of the river.

Landing.—The signal for a boat and the time it is required to the trader's house on Cavally Point will generally bring a surfboat to the outer entrance between the reefs, where it can be met by a boat from the ship. Landing in a ship's boat might with difficulty be effected, but leaving the beach again would be almost impossible. When the bar is bad there is a landing place about $1\frac{1}{2}$ miles eastward of the entrance, at a factory near Fort Verdier.

Anchorage.—Owing to the rocky nature of the bottom, vessels are recommended not to anchor off this part of the coast in less than 10 or 11 fathoms of water, but anchorage on a rocky bottom may be obtained in 7 fathoms of water midway between Cavally Point and Cavally Ledge.

The rainy season at Cavally commences in May, lasting until the middle of August, when, what is known by the natives as "the little dry season," begins and lasts till nearly the end of September; after this the rains again set in and continue till the end of November or the beginning of December. Tornadoes blow from the eastward during April and May and throughout December to the middle of January; those in the earlier parts of the year are not heavy.

Yobua Rocks.—About 3 miles eastward of Cavally River and $\frac{1}{2}$ mile offshore is a small rocky islet with a long reef extending southwestward from it; from the western extreme of this reef to the beach the space is filled with a succession of breakers and ledges of rocks.

Coast.—From Yobua Rocks the coast trends east-northeastward $8\frac{1}{2}$ miles to Tafu Point, the shore being formed by a sandy beach, off which lie a few rocks, and along which are several villages, conveying the idea of a numerous population. Southward of the village of Biahuin a rock, with less than 6 feet of water over it, lies nearly $\frac{3}{4}$ mile offshore. The interior appears to be one dense continuous forest, rising occasionally into clumps, either from undulations in the ground or from the character of the trees, some of these clumps being nearly 200 feet above high water.

Tafu Point, $8\frac{1}{2}$ miles eastward of Yobua Rocks, is a small, bold cliff with a depth of 3 fathoms close to its base.

Tabu River is small, but expands into a lagoon before issuing, at 250 yards northeastward of Tafu Point, through a narrow channel not more than 50 yards in breadth. Between Willson Point, the western entrance point, and Tafu Point, a reef of sand and rocks, some of which are dry, extends to the southeastward. On the bar between this reef and William Point, the eastern entrance point of Tabu River, there is a depth of 3 feet at low water. The river is navigable for canoes during the season of low river as far as the first rapid, about $9\frac{1}{2}$ miles from the mouth, but there is very little commerce.

The shallow channel lies along the eastern shore till a spit of sand, which projects from Willson Point, and is nearly awash, is rounded, and even then the water scarcely deepens for a mile within the entrance.

It is stated that the bar is worst at full and change of moon, but can generally be crossed in a surfboat, except during the rainy season, when it is frequently impassable; nevertheless, this little river

is a convenient place for wooding and watering, being easy of access to ordinary boats when the bar is smooth. There is anchorage in 7 fathoms within $\frac{1}{4}$ mile of its mouth.

Light.—A fixed white light, 82 feet above high water and visible 10 miles, is exhibited from a masonry tower 33 feet high, painted white with one black band, at the entrance of the Tabu River.

Wreck—Landmarks.—The following information is from the commander of the French gunboat *Surprise*: "The wreck of the steamer *Admiral Exelmans*, broken in two, lies on a rock, not shown on the charts, located 1.7 miles 77° from Tafu Point. The wreck has disappeared.

A short distance westward of Tafu Point, on the beach, are two large radio masts visible a long distance, and at the foot of the masts is the radio station, consisting of a white house with a red roof.

The anchorage is recognized by the lighthouse, behind which, on a hill 65 feet high, rises the residence, a large house painted gray and blue, with red roof, and by the radio masts.

North-northeastward of the lighthouse, on a hill on the left bank of the Tabu River and to the left of the native village, is a conspicuous group of houses painted white, with red roofs. On the right bank of the river near Willson Point stands a house with red roof with a small flagstaff, where vessels arriving at the anchorage are communicated with by means of the International Code.

Communication.—The African mail steamers call here when they have cargo for the place and pass within signal distance.

Supplies.—To obtain wood it is necessary to get the consent of the neighboring chiefs, who style themselves, respectively, the River King and the Hill King. The former possesses the large village of Kablake on the eastern side of the entrance to the river, while the dominion of the latter is confined to a village which stands on a rising ground about $\frac{1}{2}$ mile farther to the eastward and is well stockaded. There are two English, one French, and two native factories, and here is a French military post. One of the factories is painted white, with a red roof.

Some small cattle, sheep, goats, and fowls, with bananas, sweet potatoes, cassava, pumpkins, and rice may be procured. Colored cloth and most manufactured articles fetch their full value all along this coast, but, above all other things, rifles and powder are most desired.

Water.—At the last of the ebb tide fresh water may be obtained in any part of Tabu River, but it is more prudent to procure it about $\frac{1}{4}$ mile within the entrance, abreast of a small detached sandbank, where the boats may anchor in the middle of the stream and fill their casks alongside.

Rocks.—Some rocks above water and sunken dangers lie eastward of William Point and also off James Point, the next to the eastward. Off the Hill King's village there is also a small reef. All these dangers have $2\frac{1}{2}$ fathoms close to their southern edges. The most dangerous of them lies 670 yards, 156° , from the Hill King's village; it has 3 feet of water over it, with a depth of 3 fathoms close around.

Tides.—It is high water, full and change, in Tabu River at 4 h. 45 m.; springs rise from 3 to 4 feet.

Tabu Point, about $2\frac{3}{4}$ miles, 61° , from the entrance to Tabu River, is low and foul, and $\frac{3}{4}$ mile, 134° , from it is a rock with $2\frac{1}{2}$ fathoms of water on it and a depth of 9 fathoms outside it.

Tabu Point is double, the northern projection being named Segre Point. There is a village on each projection, and close around Segre Point to the northward is West Pahona River, which is barred, but open probably during the rainy season.

Grand Tabu (Segre) is a large native village, 1 mile northeastward of Tabu Point. An isolated reef lies about $\frac{1}{4}$ mile from shore in front of the village.

Anchorage for trading purposes may be had in 13 fathoms, over black mud, off Grand Tabu; in a less depth the bottom is bad. The natives are treacherous and should be guarded against.

Basha Point.—The bight between Tabu and Basha Points, except for the reef off Grand Tabu, is clean, with regular soundings and a sandy beach. Basha Point is capped with rock, which seen from the westward resembles the outline of a fort. A reef extends nearly $\frac{3}{4}$ mile southeastward from the point, and the town upon the point stands 50 feet above high water.

The town of Grand Basha, $1\frac{1}{4}$ miles northward of Basha Point, may be known by a long, low house with a gray roof, and also by Wappu Grove, which stands on rising ground 5 miles northward from the point.

Du Enun Hill, 15 miles northwestward from the point, is likewise a conspicuous object.

A chain of reefs commences $\frac{1}{2}$ mile westward of the point and continues $1\frac{3}{4}$ miles to the northeastward. They extend more than $\frac{1}{2}$ mile offshore and lie in detached groups, with a boat channel between them and the beach. This part of the coast should be approached with great care, as Penelope Rock lies $1\frac{1}{2}$ miles offshore, with Basha Point bearing 263° , distant 2 miles.

Rocks.—The master of the steamship *Madeira* reports the discovery of the following rocks, over which the depths are not stated, off Basha Point:

A rock on the bearings:

| | |
|---|-------------|
| Uhameno Point..... | 354° |
| Smaller of two islets close to Basha Point..... | 295° |

A rock about 1,600 yards 86° from the same islet mentioned above,

A rock about 2,300 yards 76° from the same islet.

These rocks sometimes break and they will be placed on the charts as rocks with less than 6 feet over them.

Wreck.—The wreck of the steamer *Wineba* lies on the large reef 1,400 yards northeastward of Basha Point.

East Pahona River, about 1 mile northeastward of Basha Point, like most of the rivers on this part of the coast, forms a junction with another stream just at the shore. There is a bar before it, and also two reefs a short distance outside the bar, with a narrow boat channel between them.

Wappu (Niabuekru) Point.—From Grand Basha a broad and nearly straight beach extends $3\frac{1}{2}$ miles to Wappu Point, a small rocky cliff on which a native town stands about 60 to 70 feet above high water. It is quite safe to approach and bold on its southern face; but to the eastward there are some offlying rocks along the shore for the distance of 1 mile, none of which extend more than 300 yards from the coasts. At Wappu there are three trees standing well above the surrounding bush; they are conspicuous from the eastward but invisible when abreast the point, and at a distance of 1 mile 334° is Wappu Grove, the top of which is about 344 feet above high water.

There is no permanent opening through the beach at Wappu, but a large body of water that accumulates there sometimes issues just westward of the cliff. This water is connected with a long and narrow lagoon, which lies close behind the beach, and reaches to the small river near Poor Point, a distance of 9 miles. The sandy barrier that separates this lagoon from the sea is covered with trees, but occasional bare spots show where the waters burst through in the rainy season.

Poor Point, on the western side of a small river, is low and rocky, and some rocks extend from it to the eastward, about $\frac{1}{4}$ mile, in front of the entrance to the river, which is very narrow, but not entirely close. These rocks, many of which are above water, are steep-to, having a depth of 4 fathoms close seaward of them.

Half Berebi.—The native town of Half or Little Berebi stands upon Sagree Point, the second point northeastward of Poor Point. The numerous villages near the shore appear to be thickly peopled. Half Berebi is one of the few places on this part of the coast where landing is possible. The best landing place is, however, on the northern side of Ible Point, 1 mile to the northeastward.

Rock.—A pinnacle rock of $3\frac{1}{4}$ fathoms, with depths of $6\frac{1}{2}$ fathoms around is situated 1,400 yards eastward of Sagree Point.

Anchorage.—The best anchorage is in about 12 fathoms of water, $\frac{1}{2}$ mile from the shore, with the residency on Ible Point bearing 0° , and Sagree Point 270° . Vessels should not use the eastern part of

this anchorage owing to the presence of the above rock, except southward of the line: "Conspicuous gray rocks" will open southward of Sagree Point bearing 241° . This is now more frequented than that of Grand Berebi.

Coast.—From Poor Point the coast trends northeastward for 11 miles to the rocky bluff of Kadabu, and is a succession of sandy bights divided by rocky points. The whole country appears as a vast forest, rising gradually into dark, wooded hills, one of which, Berebi Copse, lying $2\frac{1}{2}$ miles 16° from Poor Point, is 297 feet above high water.

Round Mountain, $11\frac{1}{2}$ miles 328° from Poor Point, and Long Mountain, 8 miles 345° from the same point, are of moderate elevation, but are good landmarks from the offing.

An extensive line of reefs commences 3 miles northeastward from Poor Point and lies parallel to the coast for a distance of $4\frac{1}{2}$ miles, terminating rather more than $\frac{1}{2}$ mile southwestward of Devil Rock; near the northeastern end are several rocks above water. The average breadth of this chain of reefs is about 1 mile, and there is a safe passage for boats between it and the shore, with regular soundings of from $1\frac{1}{2}$ to $4\frac{1}{2}$ fathoms. This whole chain is steep-to on the outer side, there being 6 fathoms of water within a few yards of it, and farther out there are no dangers, the soundings decreasing regularly from a depth of 30 fathoms, which is found at 5 miles in the offing.

Rocktown Berebi, $5\frac{1}{2}$ miles northeastward of Half Berebi, has a customhouse and factory.

Devil Rock, large and oval shaped, is 45 feet above high water; the base is dark, but the numerous sea fowl, of which it is the constant resort, have whitened its flat summit. It lies about $2\frac{1}{4}$ miles 230° from Kadabu Bluff, and $\frac{3}{4}$ mile from the nearest shore. Berebi Rock, with less than 6 feet of water, lies $\frac{1}{4}$ miles 27° from Devil Rock. These rocks are both steep-to on the southern side, having 6 fathoms of water close to them, and there is a channel of from $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms in depth between them and the shore, in which anchorage may be obtained. The depths between Devil Rock and Rocktown Point, 274° from it, range from $4\frac{1}{2}$ to $5\frac{1}{4}$ fathoms over a sandy bottom.

Pelion Rock, with about 3 fathoms over it, lies in the approach to Rocktown, 600 yards 190° from Devil Rock, and 293° from Rocktown Point.

Grand Berebi.—Kadabu Bluff is a bold rocky point, the southeastern extreme of which is cleared of trees, and the bare summit, on which stands the native town of Grand Berebi or Yeh, is 120 feet above the level of the sea. From Kadabu Bluff the shore, of fine sand and bordered with large trees, makes a sudden turn to the northward, for about a mile to the mouth of Nano River, and on rising ground between stands Grand Berebi town, the huts of which

are cylindrical, with conical roofs, and here there are three conspicuous high trees above the bush. Abreast of the town and $\frac{1}{4}$ mile offshore there are some rocks named Gumara Reefs, with a boat channel between them and the beach.

Nano River, also known as the Berebi and the Poor, has a lagoon at its mouth and discharges a small volume of water, but its sheltered position enables it to wash away the bar at its entrance so as to be always open for boats. Nano Rock lies immediately off its mouth, with a depth of 2 fathoms inside it. The village of Nano is situated at the side of the lagoon, and eastward of this are the villages of Tobe and Bassa. At the latter place there is a white hut with a flagstaff.

There are several hills by which this place may be recognized from the offing; two standing together, named the Sisters, or Kadabu Hills, 315 feet high, lie 3 miles 297° from Kadabu Bluff. Akol, a sharp-pointed hill, is 5 miles 5° from the bluff, and at a distance of 16 miles in the same direction the Oval Mountains rise 1,315 feet above high water.

When near the shore the place may be known by the sudden receding of the coast line and the peculiar form of Kadabu Bluff, as well as by Katum Rock, a block of granite 36 feet high, showing white, and lying 1 mile 44° from Kadabu Bluff. Foul ground extends about $\frac{1}{4}$ mile southwestward and 200 yards northeastward from the rock.

Communication.—The steamers of the Fraissinet Co. pass monthly, and those of the Compagnie des Chargeurs Reunis call at uncertain dates to ship and discharge crews of surfboats.

Supplies.—Bullocks, goats, poultry, eggs, cassava, and oranges may be obtained.

Landing may be effected in a cove north of Croix Rock, but the entrance to the river is not always practicable for ship's boats, and the tidal streams run very strongly.

Anchorage may be had northward of Katum Rock, midway between it and the shore, in from 23 to 26 feet of water, over sand and sheltered from the swell; westward of Katum Rock in a depth of 5 fathoms over fine sand, with little swell; or in 7 fathoms of water, southward of Katum Rock, with good holding ground, but at a distance for communication. The anchorages are frequented by trading vessels who here embark Krumen.

Tides.—Spring tides rise 5 feet.

Coast.—From Grand Berebi a long sandy beach, rocky and steep-to in places, with 4 fathoms of water close to it, trends a little northward of east for 13 miles to Tahu Point. The numerous native settlements along this part of the shore are named generally the villages of Tahu. The coast is thickly wooded and of moderate elevation, the

tops of the highest trees near Tahu Point being 290 feet above high water.

Tahu Point, low and covered with forest trees, has the two villages of Bassa and Domba near the shore. They consist of round huts with conical roofs, and between them the king's house, a low, whitewashed building, with a flagstaff, is a conspicuous object from a distance.

Eastward of Tahu Point the shore changes its character, isolated and irregular hills rising immediately over the beach.

Supplies.—Eggs, tapioca, and coconuts may be procured from the villages near Tahu Point.

Rocks.—In this extent of coast there are many rocks, both above and under water. The first group, situated $1\frac{1}{2}$ miles eastward of the large white rock of Katum, is about 2 miles long and extends $\frac{3}{4}$ mile from the shore.

Bruni Rock, or Whiteman, $4\frac{3}{4}$ miles 89° from Katum Rock and $1\frac{1}{2}$ miles from the shore, is a large white rock, 33 feet above high water, with depths of 9 fathoms around it.

Naufona Reef, which shows at low water and breaks, lies nearly 1 mile 246° from Bruni Rock, with 10 fathoms around it; and abreast of it, near the shore, there is a group of rocks above water, with a channel of $3\frac{1}{2}$ fathoms between them and the beach.

White Rock, a rocky ledge, with $5\frac{1}{2}$ fathoms water on it and 10 fathoms around it, lies 78° , distant $1\frac{3}{4}$ miles from Bruni Rock. Midway between White Rock and Tahu Point, and about $\frac{1}{2}$ mile from the beach, there is a sunken rock, inside of which there is a 5-fathom channel. One mile farther to the eastward there is another shoal, nearly in the meridian of a high grove of trees; and just westward of Tahu Point a series of rocks commences, nearly surrounding the point, and in one place extending from it nearly a mile.

Some of these rocks are large masses of dark stone above water, and a narrow channel may be found through them with $3\frac{1}{2}$ fathoms of water in it; all are steep-to on the southern side, and it would not be prudent to pass Tahu Point at a less distance than 1 mile.

Wrecks.—The master of the French steamer *Rhone* reported having touched on a sunken danger, supposed to be a wreck, lying about $2\frac{1}{2}$ miles south-southwestward of Tahu Point. It is possible that this may be the wreck of the *Soudan*, the position of which, not accurately ascertained, was placed in latitude $4^\circ 41' 45''$ north, longitude $6^\circ 39' 45''$ west. Although this danger was unsuccessfully searched for in 1895, it will be well for passing ships to give this point a wide berth.

Coast.—From Tahu Point, just westward of which is a small factory, to Mohikrako Point a series of rocks and breakers extends along the shore at an average distance of $\frac{1}{2}$ mile. The rocks are all steep-to on the seaward side, and there is a safe 3-fathom boat channel between them and the beach.

Diabue or Niebe Lagoon.—About $2\frac{1}{2}$ miles eastward of Tahu Point is the entrance to Diabue or Niebe Lagoon, into which flows the Boba River, a small muddy stream. The entrance to the lagoon is entirely barred by a broad bank of sand. About $\frac{3}{4}$ mile within the entrance is Bird Islet, which is small and wooded. The lagoon is said to be connected with San Pedro River by numerous channels, none of which are practicable even for canoes.

San Pedro Rock, 16 feet above high water, lies about $\frac{1}{4}$ mile southward of Pata Point and 3 miles eastward of Tahu Point.

Soudan Rock lies about $\frac{1}{2}$ mile 123° from San Pedro Rock, and about $\frac{3}{4}$ mile 237° from San Pedro Rock is Yoque Rock, on which the sea breaks.

Mohikrako Point, 6 miles northeastward of Tahu Point, is a bold rocky peninsula, off which some rocks extend for a short distance. It forms the southern entrance point of the San Pedro River and, by its shelter, renders the bar of the river generally passable.

Immediately inland from the isthmus which connects Mohikrako Point with the mainland is a rocky hill 355 feet high. A small river lies westward of the point.

San Pedro or Ye River, a fine open stream, entering the sea northward of Mohikrako Point, is extremely tortuous and encumbered with fallen trees, but at the season of flood it can be ascended for three days' journey. The bar is practicable for whale boats and has a depth of 6 feet at low water, the channel being about 50 feet wide. At slack water, or with the first of the flood, is the best time for entering; at low river, however, it is not navigable for canoes for a distance of more than 6 miles from its mouth.

Tides.—It is high water, full and change, at San Pedro River at 4 h. 20 m.; springs rise about $5\frac{1}{2}$ feet. The tidal streams in the river are very rapid and the ebb strong on the bar.

Westward of the entrance, on a hillock, situated inside the peninsula, which the river forms upon its right bank, is the customhouse—a white house with a zinc roof—which forms a good landmark. The mouth of the river is seen only from the southeastward, being covered by the peninsula above mentioned. There are two factories here.

There are several villages on the banks of the river, the principal being Little and Great Poro, about 3 and 4 miles, respectively, from the entrance, on the eastern and western banks.

Communication.—The Colonial mail steamer calls here irregularly.

Supplies.—Bullocks may be procured, and fresh water taken from the river about 6 miles from the entrance, but it is suitable only for washing purposes.

Coast.—Eastward of the entrance to San Pedro River there is a sandy beach behind which are some hills, one of which has been

partially cleared of timber, and in the clearing the earth shows in red patches.

Drewin or Monoho Point, 65 feet high, bold, rocky, and covered with trees, lies 11 miles northeastward of San Pedro River, and in the space between there are a few indentations in the coast, and but two dangers. A short reef lies about 1 mile westward of Ensu Point, which latter is 4 miles northeastward of San Pedro River; behind Ensu Point is a lagoon which receives the waters of the Brimay River, the mouth of which is closed during the dry season; it is, however, always navigable for canoes for a distance of about 12 miles from its outlet. Boboro Rock is the western of two rocks, situated $3\frac{1}{2}$ miles eastward of Ensu Point, which lie about $\frac{1}{4}$ mile from the coast in front of a village, with a clear 3-fathom channel between them and the shore.

The approach from the offing is everywhere safe, with regular soundings. The land here gradually attains a little higher elevation, and is more diversified with hill and dale than the coast to the westward. East Tree Hill is 400 feet above high water; Temple Hill 517 feet; and the whole range, which extends 27 miles along the coast to Sassandra River, is known as the Highland of Drewin.

Half or Little Drewin.—On the northern side of Drewin Point there is a small bay, known as Victoria Gulf, with the two villages of Half Drewin and the customhouse with a red roof, situated at the base of the hills; three large rocks lie eastward of Drewin Point. The Krumen name the inhabitants "The Saucy Drewins," from their rough and noisy habits. There is a landing place eastward of the customhouse.

Abrapa Cliff.—From Half Drewin a succession of small rocky points, with slightly receding sandy beaches between them, extends in a straight line for 6 miles to the white cliff of Abrapa, off which there are two rocky banks, with breakers extending about 300 yards from them to the southward. The white cliff is not readily distinguished. In the space between there are also three small streams, but all barred across their mouths.

Enframa Point.—From Abrapa Cliff to Enframa Point, a distance of 7 miles in a northeasterly direction, the coast continues of a similar character; several rocks show themselves by breakers, but they are generally very near the shore, and all have a depth of 6 fathoms close-to. The most prominent of these lies about $2\frac{1}{2}$ miles eastward of Arapa Point and nearly $\frac{1}{2}$ mile offshore, with a 4-fathom channel between it and the coast. There is a conspicuous white cliff, with some reefs at its base, nearly halfway between Abrapa and Enframa Points, off which latter a reef extends about $\frac{1}{4}$ mile.

Kassi Point lies about 4 miles northeastward of Enframa Point. In the bay between, the Kbego and Niega, both small rivers, have

their outlets in a lagoon and are barred in the dry season. The Kbeggo is navigable for canoes for about 2 miles, and the Niega for about 5 miles from the lagoon.

From Kassi Point to Swarton Corner, a distance of 7 miles in a northeasterly direction, the coast still retains its character of sandy bays and rocky points, fronted by small reefs, and with elevated land in the interior intersected by valleys.

Grand Drewin is a large village with five English and three native factories, $1\frac{1}{2}$ miles northeastward of Kassi Point, and is the present commercial center between San Pedro and Sassandra. The wood of Damadoso is a remarkable clump of tall and rounded trees on the summit of a naked hill, 2 miles westward of Grand Drewin. To the left of this clump there is an isolated palm tree, and to the right the village of Tabue built on the hill.

Off Grand Drewin there is a detached rock, about $\frac{1}{2}$ mile from the shore, and midway between this rock and Swarton Corner there is a reef with two breaking shoals outside of it, lying 1 mile from the shore. Thence to Swarton Corner the coast is clear of all danger at $\frac{1}{2}$ mile offshore.

Swarton Corner is a bold headland, 220 feet above high water, covered with luxuriant vegetation, and forms the eastern extremity of the Highland of Drewin. Some fragments of rock are scattered round the base of Swarton Corner, but there are depths of 5 fathoms close to them.

Sassandra or St. Andrew River.—At the head of the little sandy bay, eastward of Swarton Corner, the Sassandra and Tabeta Rivers discharge their united waters into the sea.

The Sassandra River has an average breadth of 200 yards, but in places is more than $\frac{1}{2}$ mile in width. It is obstructed by several rapids, with numerous islands, the mean depth of the channel being about 5 feet. In 1895 the Sassandra River was ascended in canoes at low river for nearly 70 miles to the village of Kuati. In this distance more than 25 rapids were encountered, some of which were nearly 1 mile in length. The long sandy spit, between which and the French residency lies the entrance, is submerged during the rainy season.

The bar which extends across the entrance has not been properly sounded, but in the fine season (December to April) surfboats cross it and have found depths of 6 feet; the tidal streams run strongly and the bar is very hard. A few soundings obtained from a canoe in the lagoon formed inside the mouth showed that in parts of it there were depths of from 5 to 7 fathoms. Besides the rivers above mentioned, the Bei and the Gapeh, the two smaller streams, fall into the bay, and opposite the mouth of the latter there is a large island named by the natives Nukba.

Sassandra Hills.—Five or 6 miles 307° from Swarton Corner is some elevated land, and there is a range of still higher ground, named the hills of Sassandra, the extremes of which bear from 314° to 353° , distant 15 miles from Swarton Corner. The highest part of the range is 930 feet above high water.

King George Town is on the shore about $\frac{1}{2}$ mile northward of Swarton Corner, and the French residency stands on a hill 85 feet high at the western side of the entrance to the river.

Communication.—Elder, Dempster & Co.'s steamers make King George Town call.

Supplies.—There are four factories; and bullocks, sheep, poultry, and fruit may be procured; fresh water may be obtained on the western bank of the river, near the factories.

Landing is easy at all seasons in surf boats, and in fine weather it may be effected in ordinary boats on the beach near the factories; in bad weather it is also possible to land in the southwestern corner of a small cove at the base of the cliff of Swarton Corner, but from December to April the surfboats generally enter the river. The bar of the river is generally very regular.

Light.—A fixed red light, 131 feet above high water and visible 9 miles, is exhibited from a white tower 20 feet high, is located at Swarton Corner, 1,320 yards 211° from the French residency.

Anchorage in 6 fathoms, over sand, may be obtained off the river, with Swarton Corner bearing 270° and the French residency 319° . Here, in the event of dragging the anchor, the current of the river will set a vessel off the land.

Tides.—It is high water, full and change, at 4 h. 20 m.; springs rise about 5 feet.

Rock.—In 1907 the master of the African Steamship Co.'s steamer *Fantee* reported that his vessel struck a rock in the anchorage with the French residency bearing 338° and Swarton Corner 231° .

Soundings.—The bank of soundings to the 100-fathom curve extends 18 miles southward from Swarton Corner, the 30-fathom curve approaching to within 10 miles.

Price or Daerebru Point.—A flat coast and sandy beach extend for $3\frac{1}{4}$ miles eastward of Sassandra River to Price Point, where hills again rise, those immediately about the point reaching a height of 276 feet.

This sandy beach is steep-to and quite clear of rocks, but Price Point and Ahorokoa or Trepau Point, $1\frac{1}{4}$ miles farther eastward, are both rocky, and have a few offlying rocks at their bases. There are two small bays between these points, and at the base of the hills near the shore there are numerous villages, the principal being Kadrokoa, where there are two factories. The soundings decrease more slowly

in approaching the shore here than to the westward of Sassandra River, and the bottom is everywhere of mud.

Mortality or Bruko Point, bold and without any detached rocks, lies 2 miles eastward of Ahorokoa Point, and projects but little from the line of coast; the vicinity is populous. The best landing on this part of the coast is behind a point of rocks at Yagrokoa village, about 1 mile northeastward of Mortality Point. Here the Dagbe River, navigable for canoes for about 7 miles, discharges into a lagoon of the same name.

Mount Langdon.—From Mortality Point for $5\frac{1}{2}$ miles to Mount Langdon the shore continues high and broken by ravines, through which run large streams. A few rocks lie near the shore in this space. The bank of soundings off the coast is rather flat, there being 3 fathoms of water close in and only 7 fathoms at $1\frac{1}{4}$ miles in the offing. Mount Langdon, 355 feet above high water, has a short reef extending about $\frac{1}{4}$ mile from its base, and on either side a barred-up river; here the beach is sandy, with occasional bare patches of rock upon it.

Yawoda Cliff.—At Yawoda, 3 miles eastward of Mount Langdon, a series of red cliffs begins and extends nearly 15 miles. The most remarkable of these cliffs is situated eastward of Kutru, the cliff having red cracks striped vertically with white lines. From Yawoda to the red cliff of Kutru the coast is nearly straight for 4 miles; the land continues high, much broken, and to all appearances thinly peopled. The beach is sandy and entirely clear of rocks. At Kutru the cliffs are about 150 feet above high water, while the tops of the trees on the adjacent hills rise to a height of 264 feet.

Kutru consists of eight small villages and has a customhouse and two factories. Here is Tatubo Lagoon, which has an opening to the sea at all seasons, but being encumbered with mud and sand banks it can be used only by small canoes, which also ascend for short distances the two small streams that discharge into the lagoon.

Mount Bedford.—The coast continues nearly straight for 9 miles in an easterly direction from Kutru to Mount Bedford, 238 feet high, which stands over the largest and most remarkable of the red cliffs. The shore is generally a sandy beach, though under some of the cliffs the beach disappears, and large stones, apparently débris from the falling of the cliffs, form the coast line.

Throughout this space the shore is fronted by rocks, which extend $\frac{1}{4}$ mile from it; but a vessel may stand into 5 fathoms of water without danger, and in that depth will generally be about $\frac{1}{2}$ mile from the beach.

Fresco.—The red cliff at Mount Bedford is $1\frac{1}{2}$ miles long, and its eastern extremity descends gradually to Fresco, which is a large

native town standing on a sandy point. There is a factory, painted white, just eastward of the red cliff, and a customhouse at Fresco.

The Fresco Hills, a range of high land, are situated 5 or 6 miles northward of the town.

Fresco Lagoon extends eastward 6 miles from Mount Bedford to about a mile eastward of Fresco, where it has an outlet to the sea which is barred in the dry season. Bwiko River, with depths of from 6 to 9 feet, is navigable for canoes for about 7 miles, and discharges into the lagoon northward of Fresco. Seven miles eastward of this river the Niuniuru or Dagir River at times discharges into the sea, but more frequently finds a passage to the lagoon. This latter river, which is encumbered with fallen trees, might, if cleared, be navigable for canoes to the first rapid, a distance of about 28 miles.

Anchorage.—The usual anchorage off Fresco is from 600 to 800 yards off the beach, over a bottom of sand.

Coast.—From Fresco the coast trends about 84° in an almost straight line for 34 miles to Lahu River, and is low, well wooded, and sparsely populated. The beach everywhere is of clean light-brown sand, free from offlying rocks, and the surf on it is always very high. Within this beach there is a narrow strip of stagnant water parallel to the coast throughout the whole distance, which in a few places appears to receive some small streams from the interior. Native villages, built at intervals upon the narrow belt of land between this backwater and the ocean, are generally surrounded by groves of coconut trees.

Soundings.—The soundings along this whole extent of coast are regular, there being a depth of 3 fathoms close outside the surf, deepening gradually to 10 fathoms at 1 mile from the beach. Near the coast the bottom is generally sandy, changing gradually to mud in the offing.

Pickaninny Lahu.—This town is situated 18 miles eastward of Fresco. Some rising ground 5 miles inland is known as the Kakraba or Small Hills. There are four or five white houses standing together, the westernmost, having a red roof, is detached; an isolated house stands eastward of the others.

Half Lahu lies 10 miles eastward of Pickaninny Lahu, and Grand Lahu nearly 5 miles farther in the same direction, or about 2 miles westward of the entrance to Lahu River.

Lahu (Bandama) River has a very narrow entrance, with a dangerous bar across it, on which the sea breaks with so much violence that it is not passable by ordinary boats, and even the native canoes are frequently upset upon it. During floods the river is navigable for small gunboats. Both points of the river are low and sandy. The western entrance point is covered with coconut trees, and on the eastern point there is a small town, but no trees.

The village of Grand Lahu, on the beach westward of the mouth of the river, is easily recognized by a factory with a red roof which occupies the center of the village, and has four white houses westward of it, and a factory with a white roof eastward of it. There are about 4,500 persons.

Communication.—The Marseille Steam Navigation Co.'s steamers call at Grand Lahu.

Light.—A fixed white light, 49 feet above high water and visible 10 miles, is exhibited from a white tower, 36 feet high, at Grand Lahu.

Anchorage may be had about 1 mile from the shore, over a bottom of sand and mud, with good holding ground, but vessels roll very much.

Mount Lahu, 350 feet above high water and covered with large trees, stands about $5\frac{1}{2}$ miles 11° from Grand Lahu.

Long Hills, a range commencing about 8 miles northeastward of Mount Lahu, lie parallel to the coast for 7 miles, and attain a height of 340 feet.

Tides.—It is high water, full and change, at Lahu River at 4 h. 20 m.; springs rise 4 feet.

The yellowish water of the river may be seen to the eastward at a distance of 2 miles from the land.

Coast.—From Grand Lahu a high sandy beach continues in a straight line eastward for 64 miles to Port Bouet (Pickaninny Bassam); and Grand Bassam Lagoon, a narrow backwater, extends the whole distance, at an average distance of about $2\frac{1}{2}$ miles from the shore. The land is everywhere low, without any remarkable objects upon it; and the ridge of sand between the lagoon and the sea, being thickly wooded, presents the same uniform appearance throughout, varied only by the numerous villages upon it, around each of which there is a grove of coconut trees. The beach is everywhere steep-to, $3\frac{1}{2}$ and 4 fathoms of water being found as close to the surf as it is prudent to venture.

Off Lahu River there are 10 fathoms at 1 mile from the shore; off Jack Jack, where there is one white factory, the same depth at $\frac{1}{4}$ mile; and off Port Bouet there are 17 fathoms close to the beach. The tops of the trees in the foreground are from 120 to 140 feet above high water, but near Jack Jack they rise to a height of 190 feet.

Amokwa or Jackville, a town, apparently of considerable size, lies about 37 miles eastward of Grand Lahu, and may be recognized by a gray bungalow with a flagstaff westward and several buildings and two flagstaffs close eastward of it. Immediately eastward of this again is the native village extending about $\frac{1}{2}$ mile along

the coast in a palm grove. Nine miles westward of Jackville is a conspicuous white house with a zinc roof. At times a few vessels are anchored here.

Good water in large quantities can be obtained at Jackville, and a considerable trade is carried on in palm oil and coconuts.

Communication.—The British and African Steam Navigation Co.'s steamers call here twice monthly, and the Marseille Steam Navigation Co.'s steamers have a regular service.

There is telegraphic communication with Grand Bassam.

The natives on the coast between Jackville and Grand Lahu are said to be very troublesome.

Afugu or Grand Ivory town is a native village situated about 43 miles eastward of Grand Lahu; here trading vessels anchor. There is a white house with a zinc roof close westward of Half Ivory town.

Water.—Afugu is the best place between Sassandra and Axim at which water may be obtained.

Port Bouet (formerly Pickaninny Bassam) is a native village built on a narrow strip of sand which separates the lagoon from the sea. The land continues very low for some distance inshore, with two ranges of hills to the eastward and westward.

Bottomless Pit.—Near Port Bouet, in longitude $3^{\circ} 57'$ west, is situated an extraordinary feature of this coast, known as the Bottomless Pit. The great bank of soundings fronting the west coast of Africa, even when steepest, generally preserves a regular descent, but at this point it is divided into two parts by a narrow ravine or gully of very great depth.

Eastward and westward of this place the 100-fathom curve is approximately 14 and 12 miles, respectively, from the land, but here it turns in gradually toward the coast in a funnel shape. At 9 miles offshore the two lines of 100 fathoms are nearly 4 miles apart, with as much as 400 fathoms between them. At 3 miles from the coast they approach each other within less than a mile, with a depth of 256 fathoms in the channel between. At a mile from the shore the gully is scarcely $\frac{1}{4}$ mile wide; at $\frac{1}{2}$ mile there is still a depth of 100 fathoms; and finally, at the head of this singular submarine valley, there are 20 fathoms of water at the very edge of the beach. The bottom is generally a soft bluish mud, but at the depths of 190 and 220 fathoms some coral rock has been brought up by the lead.

Anchorage—Beacons.—To indicate the anchorage off Port Bouet clear of the Bottomless Pit three sets of white pyramidal beacons 13 feet high, are placed on the shore.

Westward of the pit.—Vessels should anchor southward and westward of a line drawn 118° from No. 1, the western beacon. At a

distance of 1,600 yards a depth of 16 fathoms, gradually decreasing to the shore, will be found. The bottom is sand.

Eastward of the pit.—Steer in with No. 3 Beacons in line bearing 354° , and when the two beacons on the shore situated 900 yards 112° from No. 3 are in line, anchor in 11 fathoms, sand. This anchorage is near the landing place, but is exposed to more swell than the western.

Central Anchorage.—Opposite No. 2 Beacons a tongue of sand projects 400 to 600 yards from the shore, where there is a depth of 16 fathoms, gradually decreasing to the shore. The anchorage ground extends about $\frac{1}{2}$ mile parallel to the beach. In very fine weather a vessel may remain here for some hours; it is nearest to the landing place.

Harbor works are in progress to connect Grand Bassam Lagoon with the sea by means of a canal to be cut across the narrow strip of land, about 800 yards wide, which divides the lagoon from the sea. A provisional canal has already been completed (1907) to a length of 100 yards. This canal will be 65 feet broad and 10 feet deep, and should it prove a success it will be widened to 295 feet for the admission of seagoing steamers.

Abijeau (Abidjan) is on the mainland, 4 miles northward of Port Bouet, the distance by lagoon being 8 miles, in which, it is said, there is depth of water sufficient for large vessels. This town is the base of operations and coast terminus for a railway which in 1912 was reported completed to Dimbokro, a distance of 114 miles.

Grand Bassam.—From Port Bouet the coast trends about 101° for 16 miles to the mouth of Komoe River, on the western side of which, 5 miles within the entrance, is the town of Grand Bassam, the seat of government of the French colony of the Ivory Coast, having numerous well-built factories, schools, church, etc., the native village being composed of houses built in the European style.

There are several houses on the shore. Those to the westward have white roofs, the westernmost being the Palais de Justice; the roofs of the three eastern houses are red. About 20 small steamers are employed on the lagoon.

The town of Grand Bassam having been built on a narrow strip of sand, most of which is a swamp, the draining of the town is impossible, and yellow fever of a particularly virulent type has usually been endemic; it was, however, totally absent in 1905.

The population is about 5,000 persons.

Wharf.—A wharf extends from the shore at Grand Bassam beyond the breakers to a depth of $4\frac{1}{2}$ fathoms, and has four steam cranes, each capable of lifting 5 or 6 tons and one of 10 tons' capacity. There are five mooring buoys off the end of the pier.

Lights.—A fixed white light, elevated 13 feet, visible 10 miles, is exhibited on the extremity of the wharf.

A flashing white light, visible 18 miles, is exhibited 105 feet above high water from a cylindrical tower erected 1,650 yards in rear of the landing stage and 275 yards eastward of the axis of the wharf.

For details see Light List.

Telegraph.—Grand Bassam has a telegraph station, and it is connected by cable with Akkra and Kotonu.

Communication.—Grand Bassam is in regular steamer communication, in normal times, with Liverpool, Havre, Marseille, Hamburg, and Bremen.

Cable buoy.—A black telegraph cable buoy is moored in 4½ fathoms 500 yards eastward of the wharf to mark the cable to Konotou.

Supplies.—Provisions are scarce at Grand Bassam.

Depth on bar.—The entrance to the river, not easily distinguished from a distance, is between two low sandy points, on the eastern of which there is a clump of trees; it is very narrow, and there is a heavy surf upon the bar, which has a depth of 6 feet at mean low water.

Long vessels can not enter the river, as there is a sharp turn after passing the breakers and the stream is very rapid. Before entering it is recommended to ascertain by signal with the shore as to the practicability of the bar.

The constant discharge from Akba River discolors the sea for 4 or 5 miles from the shore, and the yellow water may be seen 2 miles westward of Grand Bassam, the edge being very clearly defined.

Anchorage in about 10 fathoms water, over sand and mud, can be obtained about 1 mile from the beach, with Government house bearing 354°.

At Grand Bassam, and along the coast from Lahu, curious sounds, resembling the rolling of a boat alongside the ship, may be heard at night; these are caused by a fish named "Corvinhas" by the Portuguese and "Crocros" by the natives.

Lagoons.—An extensive chain of inland lagoons is situated between Lahu and Assini Rivers, their only outlet being at Grand Bassam. The shores of these lagoons are densely peopled, and there is a considerable trade in palm oil. Three streams flow into these lagoons, the principal being the Akba or Komoe River.

Numerous trading posts are established round the shores of these inland waters, and several small steamers ply on them for trading purposes.

Akba or Komoe River joins the lagoon on its eastern side about 8 miles northward of the French factories at Grand Bassam. The course of Akba River has not been explored beyond about 30 miles

from its mouth, but it is said to come from a long distance in the interior.

Between April and June the river rises about 15 or 20 feet.

At Little Alepe, about 24 miles above the mouth of the river, are some rapids, which are, however, passable by small steamers.

Akba River is connected on its eastern side with two shallow lagoons, known as Ono and Kobiobue Lagoons, the latter extending almost to Assini River. The downward current at Akba River is very rapid and dangerous to small vessels lying at the anchorage northward of the French factories at Grand Bassam.

Potu Lagoon, extending northward for about 15 miles from Grand Bassam, is narrow and shoal, but navigable for steamers. It connects with Aguien Lagoon to the northwestward, into which the Me River flows.

Grand Bassam Lagoon, containing many small islands and with very irregular and densely populated shores, extends nearly 70 miles westward of Grand Bassam at an average distance from the coast of about $2\frac{1}{2}$ miles, its western part being only 3 miles from Lahu River.

At Dabu, on the northern side, about 40 miles westward of Grand Bassam, the fortified French post, no longer occupied, is going to ruins.

About 4 miles eastward of Dabu the lagoon receives the waters of Aebi or Agnibi River, which flows into it from a northerly direction, and about 3 miles farther eastward is the mouth of the Ascension or Layu River. These rivers, the Akba and another at the head of the lagoon, are the only ones which are known to communicate with it. Grand Bassam Lagoon is navigable only for vessels drawing 6 feet of water.

Dabu Bank, an extensive shoal on which the depth is 6 feet, lies about 8 or 10 miles eastward of Dabu.

Assini River, the bar of which is frequently impassable, even for canoes, except during the harmattan season, enters the sea 19 miles eastward of Grand Bassam. The intermediate beach is nearly straight, with several villages upon it. The coast is free from offlying rocks, and the surroundings are regular up to the depth of 5 fathoms, which is found close to the surf that commonly runs so high as to render landing impracticable. Near the shore the bottom is generally of dark fine sand, but outside of the depth of 10 fathoms a dark-olive mud.

The entrance to this river can be distinguished from seaward by the surf breaking farther offshore than it does along the neighboring coast; also by the whole of the trunks of the tall trees near the mouth of the river being visible, as there is no brushwood, as in some parts, to hide them.

In very fine weather small steamers drawing 4 feet can cross the bar. There are no pilots at Assini.

A large village is close westward of the entrance to Assini River, the house of the French representative being situated in the middle of a group of houses and hidden among trees.

Lagoons.—An extensive sheet of water, covering a space of about 35 miles east and west by 20 miles north and south, communicates with Assini River. The various divisions of these inland waters are known as Abi, Tano (or Tendo), and Ehi Lagoons.

Several streams fall into these lagoons, the principal being the Bia River, which flows into Abi Lagoon, and the Tano (or Tendo), which enters Ehi Lagoon. The Tano and Ehi Lagoons, with the Tano River, are free and open to the boats and inhabitants of the French and English colonies.

Sueiro da Costa Hills, which lie to the westward of Assini River, and 6 to 7 miles inland, rise toward the northeastward, where Church Mount is 540 feet above high water.

Assini.—This town lies about $8\frac{1}{2}$ miles eastward of the entrance to Assini River. Assini forms an important group of houses which extends along the coast and among which the following may be clearly distinguished:

A very large white house with veranda and white roof, visible a great distance; much farther than the lighthouse.

A short distance eastward of this house is the lighthouse, a white tower having on its right and adjacent to it a house with red roof.

Almost the same distance to the west is a small house with white roof having on its right a long house with a red roof in a group of other houses.

Light.—A fixed white light, 49 feet above high water and visible 10 miles, is exhibited from a white tower 36 feet high at Assini.

Anchorage.—The anchorage is in about 10 fathoms of water off the western factories, the westernmost of which, a small one-story building with a red roof, is surrounded by palisades and stands in the middle of the village.

Communication.—The steamers of the Elder, Dempster Co. call here.

Aforenu, or Newtown, $17\frac{1}{2}$ miles eastward of the entrance to Assini River, is an English settlement, where there are some tall palm trees.

Boundary.—The boundary between the French colony of the Ivory Coast and the British colony of the Gold Coast is a little over $\frac{1}{2}$ mile westward of Newtown.

Half Assini, or Ewiano, a village with about 1,000 inhabitants, lies 32 miles eastward of Assini River, and may be recognized by a large bungalow with a flagstaff close eastward of it.

Albani River.—From Assini River a sandy beach extends a little southward of east for 38 miles and nearly in a straight line to Albani River, the opening to which is distinguished by its tall trees. Between these two rivers Tano Lagoon extends parallel to the beach at an average distance of about 2 miles from it.

Assini Hills.—There is an undulating range of high land along this coast, which may be divided into the Assini, the Albani, and the Apollonia Hills. The western extremity of the former, about 470 feet above high water, is known as the Grotto.

Albani Hills are 340 feet high at their western extremity, but they rise a little toward the eastern part of the ridge, where it overhangs Albani River.

Apollonia Hummocks.—Eastward of the Albani River are situated the four hills or hummocks of Apollonia, or, as they are usually named, Cape Apollonia; for, lying at an angle of inclination with the coast and terminating upon the beach, with an extensive level plain to the eastward, they present, when seen from a distance, all the appearance of a long projecting point. The highest of these hummocks is about 284 feet above high water.

Between Assini River and Apollonia the whole country is covered with a dense forest, and apparently but thinly populated westward of Albani, but from that town to Apollonia the coast is studded with villages.

Coast.—From the hummocks of Apollonia to Ankobra River, a distance of 23 miles, the land presents the appearance of an extensive plain covered with forest. A high sandy beach, nearly straight, forms the coast line, and at a few yards from the shore, in the midst of palm groves, are many native villages. The soundings are everywhere regular, with no rocks or shoals, and the quality of the bottom is fine dark sand near the shore, with dark-olive colored mud in the offing.

Apollonia Fort (Behin).—This old Dutch fort (the first eastward of Sierra Leone), standing on the beach about 4 miles eastward from Apollonia Hummocks, was originally one of those strong trading houses used as a residence for the merchants and a store for their goods; it was afterwards gradually converted into military defenses, and is now in ruins.

Ebomesu River.—A straight and safe coast extends for 12 miles from Fort Apollonia to Ebomesu River, the entrance of which is very narrow, with a high surf breaking across it. The river is navigable for surfboats and small steam launches for about 13 miles in a northwesterly direction to Lake village. Ebomesu River has several conspicuous cotton trees close westward of its mouth, which, with a small hummock standing a short distance inland, help to distinguish this part of the coast.

The straight sandy beach extends only 7 miles eastward of Ebomesu River, Ankobra River there dividing it from the group of hills and rough ground which form Cape Three Points, and the whole aspect of the coast is at once changed.

Ankobra River winds round the foot of the hills from a great distance inland and pours out a considerable volume of water into the sea 2 miles northwestward of Axim. It is from 80 to 100 yards wide from its mouth to Akanko, and about the month of June, when the river is at its highest, has depths of from $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms, but it again becomes low in September. For the first 6 miles from its mouth the river flows through mangrove swamps, after which the banks, on which there are several native villages, become higher.

In this district the forests abound with fine timber, some 8 feet in diameter, the export of which is steadily increasing, but Axim is practically the only port of shipment; the logs are floated down the river. There are steam launches and lighters plying on the river; also a large store just inside the river mouth. At Sanhoman, on the western side of the river, close within the entrance are derricks and appliances for handling timber.

During a heavy swell the area inside the 3-fathom line and across the entrance to Ankobra River breaks heavily.

Boats are taken up to Tomentou, about 50 miles from the mouth, whence there is communication by land with the Wassaw gold mines. At Tomentou the river ranges about 25 feet between its high and low state, and tidal influence extends 8 miles up from its mouth.

There is a telegraph land line from Axim to Newtown.

Bar.—There is a depth of about 4 feet upon the bar, with hard bottom, which does not change much, and the rise of the tide is 3 feet.

Akrumasi Point.—This point, which forms the east entrance point of Ankobra River, has a ledge of black rocks, 16 feet high, extending 400 yards south-southwestward from it. A rock, which generally breaks, lies nearly 1 mile westward of Akrumasi Point.

Akrumasi Ledge, which dries in places, is situated 900 yards southwestward of Akrumasi Point; foul ground, with depths of from $1\frac{1}{4}$ to 3 fathoms, extends 600 yards south-southwestward from this ledge.

Axim Bay.—From Akrumasi Point to Pepre Point, the latter low with a few trees upon it, the distance is $2\frac{1}{2}$ miles in a southeasterly direction, the coast between forming Axim Bay. St. Anthony Fort, on a low rocky point, with a sandy bay on either side and some rocky ledges in front, is situated about $\frac{3}{4}$ mile northward of Pepre Point. Foul ground, with depths of $3\frac{1}{4}$ to 5 fathoms, extends $\frac{1}{2}$ mile 276° from Pepre Point. The fort is white and has a dwelling house

erected on it. Gold is found in the sand on the beach. The top of the highest building is 75 feet, and the hills, about $\frac{3}{4}$ mile to the eastward, are 300 feet above high water.

Light.—A third order occulting light, visible 14 miles, has been established on the highest part of Bobowasi Island.

The light is exhibited 78 feet above the sea from a white stone building with a red dome and shows the following sectors: Red, covering the shoals to the northward; white, covering the anchorage to the southward. The line of bearing between the two sectors is about 83° . (For details see Light List.)

Communication.—Elder, Dempster Co.'s steamers call here, and there is telegraphic communication via Cape Coast Castle. A new road has been made between Axim and the Ankobra River. Telegraphic communication is maintained via Sedondi.

Supplies.—Fresh provisions and water of inferior quality can be obtained, and there is a tug.

Hospital.—The Government maintains a public hospital at Axim, with three beds for Europeans.

Landing.—The landing is safe, being protected from the heavy swell by the rocky ledges and islets which lie in the vicinity. The best landing is on the southern side of St. Anthony Fort, near the custom-house, and it is advisable to employ a pilot when landing.

Saiaba Island, 65 feet high, covered with brush, lies 1,800 yards 306° from St. Anthony Fort and $\frac{1}{2}$ mile northwestward of Ronda Point, and is partly connected with it by a chain of rocks, between which there are deep passages for boats; reefs and rocks, above and below water, extend southwestward from this island for a distance of 575 yards. A large flat rock, nearly awash, lies 100 yards southwestward of Saiaba Island. A ledge of rocks projects about 200 yards southwestward from Kebrada Point, $\frac{1}{4}$ mile northward of the fort, and two large groups of rocks which lie immediately in front of the fort afford protection and shelter to the adjacent beach.

Paka (Giba) and Bobowasi Islands are situated southwestward of the fort, and between them and the shore as far as Pepre Point the space is nearly filled by rocks and ledges. These islets and ledges are all steep-to on the western side, having a depth of 4 fathoms close to them. There is a signal station on Bobowasi Island.

Dangers.—Numerous rocks encumber Axim Bay, of which the following are the outer and principal dangers:

Hedwig Mensell Rock, with a depth of $1\frac{1}{4}$ fathoms, is situated with Fort St. Anthony bearing 104° , distant 1.6 miles; a shoal of $1\frac{1}{4}$ fathoms lies nearly 200 yards northwestward of this rock.

Egwanga Rock, with a depth of 2 fathoms, is situated 276° of Fort St. Anthony, distant 1.9 miles.

Between Egwanga Rock and Hedwig Mensell Rock are situated numerous shoals of $2\frac{1}{2}$ to 3 fathoms.

Wreck.—The wreck of the steamer *Sierra Leone*, with masts and greater part of the hull above water, lies sunk in a position from which Fort St. Anthony bears 103° distant 1.9 miles.

This wreck is conspicuous from seaward.

Litton Rock, with a depth of $3\frac{1}{2}$ fathoms, is situated $2\frac{1}{2}$ miles 269° of Fort St. Anthony; rocky patches of from $4\frac{1}{2}$ to 5 fathoms surround this rock, extending for 400 yards, and between it and Egwanga Rock are several 5-fathom patches.

Haeven Rock.—This rock, with a depth of $1\frac{1}{2}$ fathoms, is situated 260° of Fort St. Anthony, distant 1.3 miles; foul ground, with depths of from $3\frac{1}{2}$ to 5 fathoms, extends 200 yards westward from this rock and one-fourth mile eastward of it.

Buoy.—A conical red buoy, surmounted by a staff and globe, is moored, in 5 fathoms, about 150 yards southwestward of Haeven Rock, but it is liable to break adrift, and should not be relied on for position.

Rocks.—A rock of $4\frac{1}{2}$ fathoms is situated with Fort St. Anthony bearing 84° distant $2\frac{1}{2}$ miles, and northward of a line joining this rock with Haeven Rock and between it and Egwanga Rock are several heads of $4\frac{3}{4}$ to 5 fathoms.

Rock.—A rock of $2\frac{3}{4}$ fathoms is situated with Fort St. Anthony bearing 93° , distant 1.1 miles, and a shoal of 4 fathoms with that fort bearing 66° , distant 1,900 yards.

Benin Rock, with a depth of $3\frac{1}{2}$ fathoms, is situated 253° of Fort St. Anthony, distant 1,300 yards.

Watts Rock, with a depth of $3\frac{3}{4}$ fathoms, is situated 1,400 yards 185° of Pepre Point; this rock is surrounded by foul ground, with depths of from 4 to 5 fathoms extending for a distance of 300 yards.

Trade.—Since the completion of the railway from Tarkwa to Sekondi, a large portion of the trade has been diverted from Axim to Sekondi.

Water may be purchased at Axim in small quantities, but that procured from the well behind the fort is not of good quality.

Anchorage.—Vessels can anchor in a depth of 6 fathoms, with Fort St. Anthony bearing 51° and Saiaba Island 1° .

Tides.—It is high water, full and change, in Axim Bay, at 5 h. 0 m.; springs rise 5 feet and neaps range from 1 to 2 feet.

Soundings.—The change in the character of the coast which occurs eastward of Ankobra River makes none in the regularity of the soundings, the bank to the 100-fathom curve off Axim Bay being about 20 miles in breadth, and the bottom of fine sand, the depths diminishing gradually from 100 fathoms to 3 or 4 fathoms near the surf.

Peninsula Point.—From Pepre Point to a point known as The Peninsula the distance is 6 miles in a southeasterly direction, the space between being divided into several bays by rocky points, all safe to approach within a distance of $\frac{1}{2}$ mile. The land about midway between Pepre Point and The Peninsula rises to a small hill named Mount Terceira, which is 300 feet above high water. The Peninsula appears like a low island when seen from the westward, and there is a remarkable single tree a little inshore of it.

Brandenburg Fort.—Eastward of Peninsula Point a long, straight beach is interrupted by a projecting rock, on which stands the ruin of Fort Brandenburg, 115 feet above high water, and which, being overgrown with dark trees and shrubs, is the more conspicuous from its contrast with the white sandy shore on either side.

Westward of the fort the St. Johns or Prince River flows from among the hills to the northward and passes behind the fort to a second outlet at Sekan Point, a low rocky ridge near the eastern extremity of the beach. There the land rises rapidly to Mount Heathfield, 445 feet above high water, and the highest hill in the vicinity of Cape Three Points. Viewed from the westward it appears as a bold bluff.

West Point.—The shore from Sekan Point turns southward toward Frederick and West Points, the latter a rocky bluff, with some rocks at its base, forming the southern extremity of Brandenburg Bay.

CHAPTER III.

CAPE THREE POINTS TO CAPE ST. PAUL.

Cape Three Points, $1\frac{1}{2}$ miles 129° from West Point, projects about $\frac{1}{2}$ mile from the mainland in a southwesterly direction, with Boidan Rock, a large rock 20 feet high, lying 100 yards off its extremity.

When seen from the eastward or westward, the cape appears as two hills, on the northern of which there is a tree known as the Cape Tree, and on the southern is situated the lighthouse.

Light.—A fixed white light, 75 feet above high water and visible 13 miles, is exhibited from a white lighthouse with a red lantern, 20 feet high, on the middle point of Cape Three Points.

Cape Shoals are dangerous rocks lying $\frac{3}{4}$ mile off Cape Three Points, between the bearings of 237° and 186° . The least water found on them was $2\frac{1}{2}$ and 3 fathoms, but the soundings all round are very irregular, and the bottom everywhere of rock, the shallow portions of the shoals appearing to be large detached masses with deep intervening fissures.

The lead is a bad guide to clear them, as to the westward there is a distance of little more than 200 yards from a depth of 11 to 3 fathoms, and to the southward 400 yards from 14 fathoms to that depth. These shoals are the more dangerous as the sea does not always break on them, and even when heavy rollers break in succession there is occasionally a considerable interval of time before others of sufficient volume come up.

Clearing marks.—Akwidá Point, open of East Point, bearing 58° , leads $\frac{1}{2}$ mile southeastward; and the sandy beach eastward of Frederick Point, open of West Point, bearing 4° , leads $\frac{1}{2}$ mile westward of Cape Shoals; at night no vessel should approach them on the western or southern sides nearer than a depth of 19 fathoms.

Inner channel.—There is a channel, $\frac{1}{2}$ mile in breadth, between Cape Three Points and Cape Shoals, but the ground is very uneven, with some rocky heads on which the depths are 4 and $4\frac{1}{2}$ fathoms. Few vessels can have any object in using this channel, but when necessary, perhaps the safest course to adopt will be to keep close to Boidan Rock, as 5 fathoms will be found there; the shoal water seems to lie in the form of a ridge from thence to the outer shoals.

Tides.—It is high water, full and change, at Cape Three Points at 4 h. 30 m.; springs rise 4 feet.

River Point.—About 670 yards northeastward of Cape Three Points there is a small rivulet with a rock in the middle of the entrance, and a rocky hillock on its eastern side known as River Point; and $\frac{1}{2}$ mile farther northeastward there is another outlet to the same stream. Two rocky flats extend here from the beach, on the eastern of which stands a tall stone, on account of its appearance named Nine Pin Rock.

Anama Point lies $1\frac{1}{2}$ miles eastward from Cape Three Points, and is quite safe of approach, for most of the rocks which lie round are visible and have 7 fathoms of water close to them.

East Point.—A rocky bay, nearly 1 mile across the mouth, with two small islets in it, lies between Anama Point and East Point, which latter bears from Cape Three Points 89° , distant 2.3 miles East Point, forming a high salient headland, is steep-to, having 4 or 5 fathoms of water close-to on all sides. East Tree, a large tree on the elevated ground above the point, has a remarkable appearance when viewed from a little distance on either side, and distinguishes it from any of the adjacent points.

The whole extent of Cape Three Points, that is to say, the space from West Point to East Point, is a series of hills with abrupt sides and rocky points, but without dangers that are not visible at all times, the Cape Shoals excepted. In the offing the bottom is generally of soft blue mud, though with some sandy and rocky spots.

Coast.—From East Point the coast continues of the same character for $\frac{3}{4}$ mile, where the higher lands recede, leaving an undulating country of less elevation between them and the coast, and the shore forms a sandy bay as far as Stephens Point, a rocky knoll at the western side of Akwida Cove. The eastern side of this cove is a small peninsula, crowned by the ruins of Akwida Fort.

Akwida Cove is divided into two little sandy bays, the western of which is obstructed by rocks, but the other affords tolerably good landing on the beach at high water. In the rainy season there is a small stream named Alligator, with its outlet close to the point which separates the bays.

The entrance of the cove is not more than 300 yards wide, with $3\frac{1}{2}$ fathoms of water in mid-channel, over a sandy bottom, but shoaling rapidly to the beach. From each of the outer points rocks extend about 300 yards southwestward.

Achowa Point.—From Akwida a sandy beach trends in an easterly direction for about 3 miles to Achowa Point, a broad point consisting of several rocky projections. Achowa rocks, above water, lie off this point, which may be distinctly seen from Cape Three Points, and off each of its angles there is a short reef. On the high ground above its western hill there is a grove of trees, the tops of which are

220 feet above high water, and which show well when approaching the point, particularly from the westward.

Soundings.—The soundings between East and Achowa Points are very irregular between the shore and the depth of 13 fathoms, within which strangers would do well not to approach. The space contains numerous rocks near the shore, which are to be seen above water, with channels of 4 fathoms of water inside of them; while others lie farther out and have a depth of only 3 feet, giving little or no warning of approach by the lead.

East Rock, with 3 feet over it, lies 1,400 yards 203° from Akwida Fort.

A shoal with a depth of 4 fathoms over it lies 1.2 miles 195° from Akwida Fort; another shoal with a depth of 5 fathoms over it lies 300 yards farther to the southward.

Akwida Rock, with 3 feet of water over it, lies 1.1 miles 153° from Akwida Fort.

A small rock above water lies 1.1 miles 89° from Akwida Fort. From the rock a line of detached shoals extends in a southerly direction for 1,200 yards, where there is a rock with less than 6 feet of water over it.

A shoal on which the depth is 3 fathoms lies 1,300 yards 220° from Achowa Point.

These sunken dangers are the outer of those between East and Achowa Points; for those nearest the coast the mariner is referred to the charts.

Achowa village stands in a small sandy bay, $\frac{1}{2}$ mile northward of Achowa Point, and thence a rocky indented coast extends northeastward to Dix Cove.

Dix Cove, nearly 400 yards in width at the entrance and about the same in length, is full of rocks; these leave, however, sufficient room in some places to moor boats or very small vessels. A conical heap of rocks, forming a small islet, lies 232° from Dix Cove Fort, and a reef of rocks extends from it rather more than 200 yards in a southeasterly direction, leaving a narrow channel on each side of it.

Ahanta Point, the southern entrance point, is surrounded by a belt of rocks, which occupies half the cove; and from Swanzy Point, on the northern side, a similar belt fronts the shore to Hood Point, about $\frac{1}{4}$ mile northeastward of it. On this belt, and 100 yards southward of Swanzy Point, there is a black rock, named by the natives Kumbrini, or the White Man's Death Rock, in allusion to an accident which happened there.

There are two boat channels into Dix Cove—one between Kumbrini Rock and Islet Reef, in which at low water there are only 3 feet abreast of the islet, and the other between Islet Reef and Ahanta Point, with 6 feet in it; they are both very narrow, but the eastern

is generally preferred, though leading close southwestward of Kumbrini Rock.

At low water and with fresh southerly breezes the sea breaks entirely across the entrance to Dix Cove, but it seldom happens that the natives can not get off to a vessel in their canoes, and in fine weather ordinary boats can generally land and find shelter in the cove; the bottom is sandy, with a depth of 3 or 4 feet among the rocks.

Dix Cove Fort.—The town is situated on the northern side of Dix Cove and extends from the fort to a piece of water which is stagnant, except during a portion of the rainy season; it is always a resort for alligators. The fort, square, white, and with a dwelling on it, stands on ground about 30 feet above high water, northwestward of Swanzy Point; its battlements are about 30 feet high.

At 1 mile inshore from the fort the land rises to a height of 250 feet, and 6 miles northward is Mount Swanzy, 390 feet high.

There are several large trading houses on the beach which may assist in identifying the place, but the fort, being white, is a conspicuous object when approaching Dix Cove. At night the lights of the town are of good service.

Communication.—There is a telegraph station at Dix Cove.

Water.—The fort has a large tank for its own use, but naval vessels may generally obtain water from it on application. Very long hose are required to lead the water from the fort to a boat at anchor in the small bight at its base. The country is covered with forest, and wood may be cut if required. Some supplies may be procured for money or barter, but not sufficient for a naval vessel.

Tides.—It is high water, full and change, in Dix Cove at 4 h. 00 m.; springs rise 4 feet.

Abokori Islet, about 220 yards long and 80 yards wide, lies 1 mile eastward of Dix Cove, and is small, low, and rocky, some portions of it being covered with coarse grass. The channel between this islet and the coast is 600 yards wide, but near the middle there is a rocky shoal with $2\frac{3}{4}$ fathoms of water over it, and a narrow passage on either side of it 3 or 4 fathoms in depth. Rocks and shoal ground surround the islet to a distance of $\frac{1}{4}$ mile from the northern and southern extremities. This channel affords no shelter for vessels.

Butri.—In the small sandy bay opposite Abokori Islet stands the little village of Bushau (Bushan), close to the beach; the bay terminates $1\frac{1}{2}$ miles farther eastward at Butri Point, which is bold and rocky. Northward of this point there is a rivulet, on the western side of which stand the ruins of the small fort of Butri or Bartensteen, close to the beach. Mount Bartensteen, northward of the fort, is 438 feet high and covered with high trees.

The landing is good at the mouth of the rivulet, though numerous large bowlders must be avoided.

Coast.—A sandy projection of the shore $1\frac{1}{2}$ miles eastward of Butri terminates in Adoblo Rock, a large black rock shaped like a haystack; here the character of the coast, which for 3 miles was almost steep-to, changes, and the shore is fronted by reefs, with irregular soundings and projecting rocky shoals. Adoblo Rock is surrounded by one of these reefs, extending $\frac{1}{4}$ mile from it in all directions; and a mile farther to the eastward another reef extends southward more than a mile from the shore; among all these shoals there are intricate channels available for boats.

Pompendi Point.—About $3\frac{1}{2}$ miles northeastward of Adoblo Rock stands the town of Pompendi, on a projecting point, which consists of two stony hillocks with a sandy bay between them; several rocks, on which the sea at times breaks heavily, lie southward of Pompendi Point. Above the town there is a grove of large trees, which help to distinguish the place.

Shoal.—A shoal, with 3 fathoms of water over it, lies $2\frac{3}{4}$ miles 84° from Adoblo Rock and 1 mile from the shore; from the shoal the grove of trees at Pompendi bears 18° .

Pompendi Reef.—From the southern extremity of this reef, which extends $\frac{3}{4}$ mile from Pompendi Point, the grove of trees bears 337° ; foul ground extends eastward of Pompendi Point for nearly 1 mile.

Ajua (Ayua).—The village and low rocky point of Ajua are situated $1\frac{1}{2}$ miles 52° from Pompendi; the village may readily be distinguished by the European houses on the shore, one being conspicuously placed on the point. Thence a white beach extends 4 miles to the low, sandy point of Takoradi.

A rocky ledge having depths of $2\frac{3}{4}$ to 5 fathoms over it extends nearly 1 mile 153° from Ajua.

A pinnacle rock with 14 feet of water lies 1,800 yards 187° from the village of Ajua, and with the point southward of the village of Pompendi bearing 266° , distant 1.2 miles. The sea breaks occasionally over this rock at low water.

About a mile eastward of Ajua a broad belt of reefs commences and continues to fringe the shore to Takoradi Point, the average distance of its outer edge from the coast being about $\frac{1}{2}$ mile. On reaching that point it turns suddenly toward the shore in a northerly direction and then again suddenly turns to the eastward for a distance of about 1,350 yards.

Communication.—There is a telegraph station at Ajua.

Takoradi Reef, circular in shape and about 670 yards in diameter, is detached from the fringe of shore reefs and lies still farther

out, its center bearing 102° , distant about 1,750 yards from Takoradi Point. Several of the rocks upon it show above water, and vessels should not approach it within a depth of 10 fathoms. A depth of 5 fathoms will be found at the edge of the surf, 1.1 miles from Takoradi Point.

In navigating between Dix Cove and Takoradi Point vessels should not approach nearer to the shore than a depth of 11 fathoms, unless desirous of communicating.

Takoradi Bay.—Sekondi Point bears 40° distant $4\frac{1}{2}$ miles from Takoradi Point. The coast recedes suddenly to the northward at Takoradi Point and forms Takoradi Bay, the shore of which is composed of several small bights, divided by rocky points.

The ruins of a fort stand on the southern side of one of these bights, upon a bold point about 80 feet above high water and distant 1,800 yards in a northerly direction from Takoradi Point. It is now a complete ruin and so overgrown with shrubs and trees that it can not be easily distinguished. There is a grove with some tall trees, which are very conspicuous, a little northward of the fort; at the base of the fort there is a village and another at Apoasi, a mile northward of it. At both of these places boats may land with facility under the protection of the adjacent reefs.

Apoasi Bluff is fringed with reefs, and a reef extends in a northerly direction, $\frac{1}{2}$ mile from it, and nearly midway between Apoasi Bluff and Sekondi Point a reef extends about 400 yards from the shore. With these exceptions the beach is clean from Takoradi Fort as far as Sekondi Point, and a vessel may beat up in the bay, when working to the westward, by paying attention to the lead. The bottom is of sand and mud, but rocky near the reefs off Takoradi Point. The rollers, which to the westward of that point generally break in upward of 2 fathoms of water, are here comparatively smooth.

Takoradi Bay affords more shelter than any other anchorage between Fernando Po and Sierra Leone.

Supplies.—Water can not be procured, but goats, ducks, yams, and fruit are abundant.

Barracouta Rock, with $2\frac{3}{4}$ fathoms of water over it, lies $1\frac{1}{2}$ miles 23° from Takoradi Point, and 600 yards from the shore.

A bank about 600 yards in extent, with $4\frac{1}{2}$ fathoms of water, lies $1\frac{1}{2}$ miles 40° from Takoradi Point.

Sekondi Point is a bold rocky cliff, 80 feet high, surmounted by Fort Orange, a white square conspicuous building about 180 feet long on each side.

Light.—A third order group occulting light, visible 17 miles, has been established on the southern corner of Fort Orange, about 130 feet 161° from the flagstaff.

The light is exhibited 128 feet above the water from a white tower with a gray lantern, 46 feet high. For sectors and details see Light List.

Shoals.—A rocky patch of 27 feet is situated with Fort Orange flagstaff bearing 305° , distant 1,050 yards, and a rock of 5 fathoms with the same flagstaff bearing 15° , distant 1,200 yards. A head of 29 feet is situated 50 yards inshore of the latter.

Foul ground extends from 600 to 700 yards offshore westward of Sekondi Point.

Hobbs Point.—From Sekondi Point the coast trends in a north-northeasterly direction for 850 yards to Hobbs Point, the southern point of Sekondi Bay, and is fronted by a reef extending from the coast.

Breakwater.—A breakwater, 675 feet long, is in course of construction extending to the north by east from Hobbs Point; in 1912 a length of 232 feet was completed.

Lights.—From the outer end of the work in progress two fixed red vertical lights are exhibited, visible from a distance of 1 mile.

The upper light is elevated 20 feet, and they are 3 feet apart.

Tsiakur Bansu Point is situated 1,150 yards to the northwest by north of Hobbs Point, the coast between receding and forming Sekondi Bay. A conspicuous municipal boundary pillar, 6 feet in height, is erected on Tsiakur Bansu Point at an elevation of 43 feet.

Piers.—Two iron railway piers, with steam cranes, and a depth of 3 feet alongside, are situated on the southwestern side of the bay; a wooden pier is situated between them.

Harbor works.—A small harbor for lighters is in course of construction between the southern pier and Hobbs Point.

Landing.—The ordinary landing place is at the northern pier; boats should be cautious when rounding Hobbs Point, as at times rollers break without warning for a distance of 300 yards off.

Hospital.—There is a Government hospital with 16 beds for Europeans and 24 beds for natives.

Communications.—The mail steamers of Elder Dempster Co. call outwards and homewards.

There is telegraphic communication with Sierra Leone and the coast ports.

Railway.—A railway connects Sekondi with Kumasi, via Torkwa.

Coal.—About 2,000 tons are kept in stock, and the annual importation is 40,000 tons. Lighters are available.

There are two coaling wharves in addition to the railway jetty; these are 313 and 173 feet long, with depths of $4\frac{1}{2}$ and 3 feet alongside, respectively.

Supplies.—A small supply of fresh meat can be obtained from the Cold Storage Co.; vegetables are scarce.

Tides.—It is high water, full and change, at 4 h. 10 m.; springs rise $5\frac{1}{2}$ feet, neaps rise $3\frac{3}{4}$ feet, and neaps range from 2 to 3 feet.

No tidal stream is observable at the anchorage, but at 1 mile southward of Sekondi Point the Guinea Current is experienced.

Rocks.—Several rocky heads of from 19 to 25 feet are situated at from 700 to 1,200 yards east by southward of Tsiakur Bansu Point, and within the 3-fathom line are many shoal heads.

Bostock Rock, a narrow ridge 50 yards long in a north and south direction, with a depth of from 9 to 11 feet, is situated with Fort Orange flagstaff bearing 227° , distant 900 yards.

Angola Rock.—This pinnacle rock, with a depth of 17 feet, on which the steamer *Angola* struck in 1901, is situated with Fort Orange flagstaff bearing 241° , distant 700 yards.

A pinnacle of 19 feet is situated 100 yards to the southeast by south of Angola Rock.

Buoy.—A red conical buoy, surmounted by staff and ball, is established eastward of Angola Rock.

Beattie Rock.—This pinnacle rock, with a depth of 19 feet, is situated 800 yards to the west by north of Fort Orange flagstaff. A pinnacle of 29 feet is situated 450 yards to the southeast by east of Beattie Rock, and between them are several heads of 26 to 30 feet.

Anchorage.—Merchant vessels generally anchor in the most convenient vacant berth, avoiding the foul ground off Sekondi Point.

Southward of a line drawn 107° from this point the bottom is of sand and mud, and northward of that line chiefly of sand, but apparently good holding ground.

A good berth for a vessel of moderate draft, making a short stay is in a depth of $4\frac{3}{4}$ fathoms with Tsiakur Bansu Point bearing 344° and Fort Orange flagstaff 239° .

No vessel should anchor inside the 3-fathom line, as at times the rollers are dangerous.

Sekondi.—The European town is situated northward of Sekondi Point; the native town faces the sandy beach to the westward.

The population is industrious and numbers about 5,000.

The soil in the vicinity is productive, and there is a large fishing industry.

Sekondi being the terminus of the Tarkwa and Kumasi Railway, is becoming one of the most important ports on the coast.

Coast.—Between Sekondi Point and Aboaddi Point, a salient point $4\frac{1}{2}$ miles northeastward, the coast forms a bay about 1 mile in depth, containing several sandy beaches and abrupt rocky points, off which there are generally a few rocks. Between its extreme points the depths are from 4 to $5\frac{1}{2}$ fathoms, decreasing regularly to the shore,

and with no danger at $\frac{1}{4}$ mile from the beach. The surrounding shores have a broken appearance, though of a tolerably uniform height when viewed from a distance of 4 or 5 miles, and are without any remarkable features.

Suchu Reef, $\frac{1}{2}$ mile long, lies off Suchu Point, nearly midway between Sekondi and Aboaddi Points, and extends parallel to the coast, with a boat channel inside it. Off the mouth of Anamkwon (Anangkon) River (which is barred in the dry season), about 1 mile northeastward of Suchu Point, there are a few rocks.

Aboaddi Point, a double point of low rocks, with a conspicuous clump of palm trees near its extremity, has a narrow reef extending $\frac{1}{2}$ mile in an easterly direction from it; several rocks on this reef are above water; one, having a white top, lies 300 yards from the point.

Landing.—There is a village situated at the foot of the hillock which rises from Aboaddi Point, and the landing to the eastward of it is good, being sheltered by the reef which extends from that point.

Sherbro Bank, with 19 feet of water over it and 4 fathoms around it, lies off Aboaddi Point, its shoalest part bearing 212° , distant $1\frac{1}{4}$ miles from Aboaddi Point, and 74° from Sekondi Fort. Sherbo Bank breaks when the rollers are unusually heavy.

The *Stamboul*, drawing $18\frac{1}{2}$ feet of water, is said to have touched a shoal, apparently an extension of Sherbo Bank to the southwestward, lying with Aboaddi Point bearing 33° distant 1.7 miles, and Muraba 272° .

The wreck of the steamer *Montauk*, visible above water, lies sunk on the eastern side of the bank at $1\frac{1}{2}$ miles to the south by west from Aboaddi Point.

Roani Bank, 3 miles 181° from Aboaddi Point, is a rocky bank 1 mile long, with a least depth of 6 fathoms. It is said to be a favorite fishing ground.

Bassubu Rocks lie 54° distant about 1 mile from Aboaddi Point, the coast between forming a little sandy bay; from them a reef projects nearly $\frac{1}{2}$ mile in an east-northeasterly direction. About $\frac{1}{2}$ mile farther to the northward there is another foul point with a similar reef extending from it, and thence the coast is fringed by a succession of reefs, with $3\frac{1}{2}$ fathoms of water close to their outer edge. They lie within $\frac{1}{3}$ mile from the shore, but there is one detached rock, with 9 feet of water over it, which generally breaks, and which bears 133° , distant 1.1 miles from the fort of Chama, being 1 mile from the shore.

Chama Bay extends $4\frac{1}{2}$ miles from Aboaddi Point to the Red Cliffs of Kotobrai. Shoaler water than charted is reported in this bay.

Chama Fort (pronounced by the natives Eshama) stands upon rising ground about 300 yards from the beach, behind the native town, which it overlooks. It is a strongly built, square edifice, with bastions at the angles, a dwelling on it, surrounded by a wall, and being white, it is conspicuous from seaward. The truck of the flag-staff is 74 feet above high water.

The approach to Chama Fort is obstructed by reefs of rocks, through which there is a narrow passage for boats at low water (provided the surf be not high), as the winding channel between them may then be perceived. At high water they are all covered except a few large boulders, and the sea breaks so heavily as to present, to a stranger, no apparent channel. The landing place is eastward of the fort, though canoes safely wind their way among the western rocks.

Communication.—There is a telegraph station at Chama.

Elder, Dempster Co.'s steamers call at Chama outward and homeward.

Dispensary.—A free dispensary at Chama is maintained by the Government.

Mamua Rock, in the fairway of Chama Bay, about 800 yards long, in an east and west direction, with a general breadth of about 200 yards, has 11 feet least water over it, and at its eastern and western extremes there are depths of 17 and 14 feet, respectively; the bottom is very rocky and uneven; the shoalest part lies about 1.1 miles 276° from Chama Fort.

Buoy.—A conical buoy, painted red, is moored about 400 yards southeastward of the center of the rock, with Chama Fort bearing 288° and Busum Prah River 330° . This buoy is not to be depended upon.

Prah Rock, with 6 feet of water over it, and 3 fathoms close round, is very small; it bears 77° from Chama Fort, distant 1 mile, and 141° , $\frac{2}{3}$ mile, from the mouth of Busum Prah River.

The steamer *Ville de Ceara*, in 1894, when at anchor in Chama Bay, struck a rock (depth not mentioned) lying with Chama Fort bearing 276° , distant about 2 miles, and Aboaddi Point, 235° .

Anchorage.—Vessels may anchor in Chama Bay in 7 fathoms of water, over sand and mud, about $1\frac{3}{4}$ miles, 119° , from the fort. The trend of the coast affords considerable protection from the swell, even in the rainy season.

Busum Prah River, which falls into the bay between two lagoons 1 mile northeastward of Chama Fort, has only been examined for about $2\frac{1}{2}$ miles from its mouth, where it is about 100 yards wide. It has about 2 feet on the bar, which is impassable by ordinary boats, but the natives take their canoes in and out of the river. The banks,

fringed by mangroves, are only 3 or 4 feet above the water. The river is said to flow from a considerable distance inland and to be navigable for vessels for a distance of 90 miles from its mouth, above which there is canoe communication with Kumasi.

The ground, which to the westward rises considerably above Fort Chama, sinks into a flat country to the northward. Some hills, however, are seen to the northwestward, and one, distant 9 miles from the fort, bears 18° from it.

Kotobrai Cliffs.—A straight beach, nearly 4 miles long, extends from Busum Prah River to the red-earth cliffs of Kotobrai, which are five in number, with small sandy bays between them and some large rocks above water at their base. An irregular line of rocks and breakers commences a mile to the westward of these cliffs and fronts their whole length, but it extends only $\frac{1}{4}$ mile from the beach.

The highest land in the vicinity of the cliffs is about 270 feet above high water, whence the ridge descends gradually to the lagoon near Busum Prah River to the westward and to Abroti River to the eastward, which latter, like most of the streams on this coast, has no communication with the sea till the rains begin.

Gold Hill, or Assay Point, is $3\frac{1}{2}$ miles eastward from Kotobrai Cliffs, the coast between being nearly a straight beach of sand. The point forms but a slight projection from the coast line, but, being surmounted by an isolated hummock, it has a remarkable appearance when seen from the westward. A ledge of rocks having 3 to 5 fathoms over it extends 1 mile 130° from Gold Hill.

Kommenda Point.—From Gold Hill to Kommenda Point the shore is low and fronted by rocks. Kommenda Point is also low and rocky, and close eastward of it the Susn River passes between the forts of Kommenda. The fort, standing on the western side of the river, is a square building of about 190 feet each way, with bastions at the angles; but having been for some years abandoned, it is rapidly going to decay.

Landing.—A native town stands at the foot of each fort, and tolerably good landing will be found in the little recess of the beach between them, under the high bar of Susn River, the waters of which seldom break through it in the heaviest rains, but expand into a shallow pestilential lagoon.

The village of Akal Aki is on the beach 1 mile eastward of Kommenda Point.

Ampeni Point is low, and lies 3 miles 80° from Kommenda Point. A ledge of rocks extends about 300 yards eastward from Ampeni Point.

Kassi Reefs, which extend 96° for $1\frac{1}{2}$ miles, are separated from the ledge off Ampeni Point by a 2-fathom channel available for boats. A depth of $3\frac{1}{2}$ fathoms is found close to the outer edge of the

reefs, and the surf at times breaks over them in high rollers; inside the reefs the depths are very irregular, having at one time 4 fathoms on one side and 2 fathoms on the other.

Ampeni.—The town of Ampeni, which stands on the shore $\frac{1}{2}$ mile eastward of Ampeni Point, contains a large population; and a little farther to the eastward there is another town, Akimfu, which is built on the summit of a small hill. Between the two towns the Akiabu River comes down to the back of the beach, after winding among the rising ground that approaches the coast on its western side. About $\frac{3}{4}$ miles eastward of Akimfu there is another pent-up river, named the Branu. The land about here appears broken into small hills, one of the highest of which, on the eastern side of Branu River, is 203 feet above high water.

Amkwana.—The village of Amkwana stands on the beach about $1\frac{1}{2}$ miles eastward of Branu River, and a little eastward of the village there is another stagnant river, known as the Bibo.

Busum Accra Reefs.—From about $\frac{3}{4}$ mile westward of Amkwana the Busum Accra Reefs front the shore for a distance of 2 miles, showing themselves in four distinct patches, on which the rollers break heavily. There are depths of 4 fathoms close to their outer edge, and their eastern extreme lies $\frac{1}{2}$ mile from the shore.

Coast.—From Amkwana to Elmina the coast rises into downs of moderate elevations at various distances from the beach, many of which have been cleared of forest and are now cultivated. The beach is of hard sand, and nearly straight for 3 miles to Elmina Point.

Elmina Point, on which stands the fort of St. George del Mina, is surrounded by rocks, which extend to the eastward, and on which the sea breaks with great violence, especially when the sea breeze sets in. The outer rock on the reef extending eastward from Elmina Point uncovers 2 feet at low water, and has a depth of 8 or 9 feet close outside it; this rock lies 150 yards from the extremity of Elmina Point. In the vicinity of this reef the bottom is fine black sand.

Rollers break at a distance of 300 yards from Elmina Point in fine weather, but in bad weather they extend to 600 yards from the shore.

Landmarks.—The redoubt in ruins has been demolished, but the French consul's house, referred to as the governor's house, is a conspicuous mark.

Elmina Bay is on the northern side of Elmina Point; the surrounding country is undulating and thickly wooded, with some residences and farms, which afford agreeable retreats from the heat of the town.

Elmina Castle.—The castle of St. George del Mina stands on a low rocky peninsula on the southern side of the small Beya River,

which passes within 20 yards of one of its gates, and is in a good state of repair.

The channel leading into Beya River lies on the northern side of the passage between stone embankments, and is from 3 to 4 feet deep, and between the river entrance and the reef extending from Elmina Point there are depths of from 3 to 8 feet, over fine black sand with rocky patches. The peninsula is connected with the opposite bank by a wooden bridge, which is built on two arches, each 20 feet wide and 6 feet above high water. Above the bridge for a short distance Beya River is about 40 feet wide, with a depth of from 3 to 4 feet in mid-channel on a black sandy bottom.

The deposit from Beya River is slight and appears to be carried well to seaward by the ebb stream.

A large native town, which occupies the whole breadth of the peninsula, extends along the beach westward of the castle, and communicates with it by a drawbridge. The fort of St. Jago stands on a hill about 100 feet above the sea on the northern side of Beya River; De Veers Redoubt is situated westward of the town southward of the river, and Beckenstein Redoubt, near Beya River, to the westward of Fort St. Jago.

Elmina is a good place to make when coming from the westward and bound to Cape Coast Castle. The fortifications of Elmina are colored blue, while those at Cape Coast are red.

Communication.—There is a telegraph station at Elmina.

Coal and supplies.—No coal can be obtained, but there is sometimes a small stock of patent fuel; fresh beef and bread may be procured; vegetables are scarce, and if required notice should be given.

Good water may be obtained from Sweet River between Cape Coast Castle and Elmina.

Hospital.—At Elmina there is a public hospital, maintained by the Government.

Landing.—The rocks off Elmina Point are of essential service in sheltering the landing place at the mouth of Beya River, where the water is, however, very shoal. Ordinary boats should only land on the beach at high water.

Landing may be effected in ships' boats in the Beya River during the dry season when the surf is not very high, but, the entrance being obstructed by a bar, it is not safe at or near low water. In making for the river the rocks off Elmina Point should be given a wide berth, steering out into the bay until the river is well open. It is said that at one time vessels of 50 to 90 tons could enter Beya River at high water. A Government surfboat communicates with men-of-war off Elmina.

Anchorage.—In Elmina Bay the depth of 18 feet is generally about 300 yards from the beach and the same distance from Elmina

Point; but there is a shoal, with that depth over it, in the center of the bay, with Elmina Point bearing 236° distant 700 yards. The bottom is of fine black sand, affording fair holding ground. Anchorage may be taken up off Elmina in 7 or 8 fathoms of water over sand or shells and mud, with St. George Castle bearing 293° distant about $1\frac{1}{2}$ miles; or with Mount Ekwafu well open eastward of Fort St. Jago 316° , in a depth of 5 fathoms, over black mud, with the southwest angle of St. George Castle bearing 276° and the redoubt, in ruins, near the governor's house, 321° , or, if necessary, a vessel may anchor for the night in a depth of 13 fathoms, 5 miles off the land, between Elmina and Cape Coast Castle.

Current.—Around Elmina Bay the current follows the course of the shore from west to east; there is an indraft to Beya River on the flood.

Tides.—It is high water, full and change, at Elmina at 4 h. 30 m.; springs rise 6 feet. The tidal streams at the entrance of the Beya River run strongly at springs.

Coast.—A slightly curving beach, nearly 7 miles long, extends from Elmina to Cape Coast Castle; near its western extremity there are two small barred-up rivers, and between them the shore line is rocky, but the rest of the beach is clean and the soundings up to it regular.

Cape Coast Castle.—The castle of Cape Coast (a singular corruption of the original Portuguese name, Cabo Corso) is built on a rock which stands on a projecting point of the line of the shore. From the landing the ground rises gradually to the castle, which contains the official residences, with a chapel, school, hospital, and storehouses, besides the hall of justice. There are also several spacious water tanks, from which vessels are occasionally supplied, but only by permission. At a short distance from the castle three detached forts, named Fort Victoria, Fort Macarthy, and Fort Williams, are situated on commanding hills. The fortifications are colored red.

Light.—A fixed white light, 192 feet above high water and visible 8 miles, is exhibited from a white, circular stone tower 46 feet high on Fort William, 600 yards inland.

Signal station.—At Fort William the International Code is used.

The town, named by the native Igua, occupies a considerable space northward of the castle, and besides long lines of native huts contains some handsome European houses. The Anglican Church and Wesleyan Chapel are the most conspicuous public buildings.

Tabara Rock is the native name for the great mass of granite on which the castle stands, and a large solitary stone standing on the beach, about $\frac{1}{3}$ mile westward of the castle, is known as Tabara's Wife. A little farther westward there is a small salt-water lagoon, which is separated from the sea only by the ridge of the beach. At the south-

west corner of the lagoon there is a little sandy hillock named Mount Edgecombe. The number of inhabitants of Cape Coast Castle is about 10,000, almost all of whom are natives.

Communication.—English mail steamers call several times a month, and there is a German line from Hamburg; French steamers to and from Marseille call irregularly. There is a telegraph station at Cape Coast Castle.

Landing.—The landing is in a small bay under the northeastern bastion of the fort, behind some rocks, which generally afford much shelter from the sea. During the dry season landing in ordinary boats is frequently practicable.

Hospitals.—There is a public hospital, maintained by the Government, containing 6 beds for Europeans and 25 for natives; also a hospital for the treatment of contagious diseases.

Anchorage.—During the dry season vessels may anchor anywhere off the castle (avoiding a shoal with a depth of 3 fathoms over it, situated nearly 400 yards 119° from it), as the ground is clear of rocks, the bottom generally fine dark sand, with sometimes minute broken shells, and the depth decreases regularly and slowly to the shore; but in the rainy season, when there is usually a long swell, it will be prudent to anchor in 10 fathoms of water, with the castle and Fort William in line, bearing 321° and about $1\frac{1}{2}$ miles from the castle.

An anchorage recommended is in 7 fathoms of water, with Fort Victoria and the church steeple in line, bearing 327° ; here there is said to be less swell than more to the eastward.

In the tornado season vessels not moored frequently foul their anchors, and it is well to have a long scope of chain out, as sometimes a heavy roller will come in without warning, and, if the vessel is riding short, she is liable to snap the chain.

Tides.—It is high water, full and change, at Cape Coast Castle at 4 h. 30 m.; springs rise 6 feet.

Coast.—The village of Mumford is situated at the foot of the hill which rises above Mumford Point, lying $\frac{1}{2}$ mile northeastward from Cape Coast Castle; and $\frac{3}{4}$ mile eastward of Mumford Point there is a large granite boulder on the edge of the shore named by the natives Abu Ketu.

Queen Anne Point lies $1\frac{3}{4}$ miles 63° from Cape Coast Castle, and the coast between consists of many small bays and rocky points with rocks close to them, which cause an almost continuous line of breakers along the rugged shore. The point is bold and rises to the hill of Akwon, with a village and the ruins of a fort on it. At the western side of the hill the small barred Barka River terminates; the adjacent land is hilly and covered with trees.

Mori Point, on which stood in 1885 a solitary white house, bears 57° , distant $1\frac{1}{4}$ miles from Queen Anne Point. In the rocky bay be-

tween there are several rocks lying rather more than 100 yards off-shore, and on an eminence above the point Fort Nassau, a square building, in ruins, and similar to Sekondi Fort, is difficult to distinguish, owing to the darkness of the background.

A rock 400 yards eastward of the point shows two black heads, on which the sea breaks; there is a channel with 2 fathoms of water inside of it. Northeastward of Mori Point there are two barred-up rivulets, the Eper and the Amfur, and from the latter a clean shore, partly sand and partly rock, extends for $1\frac{1}{2}$ miles to the bold commanding point of Anashun.

Briwa Rock.—Nearly 1 mile northeastward of Anashun Point, and 670 yards 153° from the trading house on an eminence in the village of Briwa, there is a rock which breaks, with a depth of 3 fathoms between it and the shore and 4 fathoms close to its outer edge.

Gwonkom River.—A little to the eastward of Briwa village there is a small lagoon and farther on a barred river named the Gwonkom. Between Anashun Point and Anamaboe, a distance of 3 miles, the beach is very foul, with rocks extending $\frac{1}{4}$ mile from it in some places. Between Gwonkon River and Anamaboe there are several large black rocks close to the beach.

Anamaboe Fort.—The fort of Anamaboe, standing in a little cove upon a flat sandy beach, is not readily seen, owing to its not being kept white; it is a square building with regular bastions at the angles, and contains good barracks and storehouses and other buildings for the accommodation of a garrison. There are several white houses forming a village, and a conspicuous church with a square tower showing very white at the back of Anamaboe Fort; the hills of Kormantan also serve to indicate the place. Anamaboe has a trade of some importance.

Communication.—There is a telegraph station at Anamaboe.

Anchorage.—The westernmost of the five hills of Kormantan, in line with Anamaboe Fort, bearing 327° , is a good mark for anchoring, as the holding ground on that line is excellent, blue mud with sand and shells; the approach to the shore is quite regular from 9 fathoms of water at 2 miles distance to 6 fathoms at 1 mile; so that a vessel can take any berth according to the season.

Aga Point, about 1 mile northeastward of Anamaboe, has a small native town upon it. Some ledges of rock extend $\frac{1}{4}$ mile eastward of the point, and Aga Hill rises above it.

Kormantan Fort.—A square building constructed of reddish earth, about 100 feet on each side, with bastions at the angles, and an outwork, rises from a bold rocky base about 1 mile 52° from Aga Point. On the southwestern side of the fort there is a tower 146 feet above high water.

Landing.—On the western side of Fort Kormantan, on the slope of the hill, there is a small native village; and on the eastern side a winding path leads to a little sandy bay, which is the usual landing. Etsin River, small and barred in the dry season, discharges its waters by two branches during the rains, one into this bay and the other nearly 1 mile farther to the eastward.

Kormantan town is about 1 mile from the fort, at the corner of a ridge of high ground, on the eastern side of the valley, which is drained by Etsin River. It is a large native town, with some very tall trees, the tops of which, being 262 feet above high water, may be seen from the anchorage off Cape Coast Castle.

Salt Pond town, the principal commercial center between Cape Coast Castle and Akkra, is situated about 12 miles northeastward of the former. It may be distinguished from some distance by a large red earth building on an eminence northward of the town.

Communication.—The British & African Co.'s vessels call, and there is a telegraph station at Salt Pond town.

Dispensary.—There is a free dispensary at Salt Pond, maintained by the Government.

Anchorage.—The best anchorage off Salt Pond is in $6\frac{1}{2}$ fathoms, over hard sand, 1 mile 175° from the red earth building.

Great Tree Hills.—The country in the vicinity of Anamaboe and Kormantan is diversified with hill and dale, but does not appear to be heavily timbered; there are, however, some remarkably large trees farther to the westward, on a ridge of hills about 4 miles northward from Cape Coast Castle.

Kormantan Hills.—The most conspicuous elevations near this part of the coast are the five hills of Kormantan, which vary from 440 to 612 feet in height, and lie $2\frac{1}{2}$ miles northward of Anamaboe; a group of three hills lies about 2 miles farther northward and 4 or 5 miles northward of these is situated a ridge called the Blue Hills, on which are three hummocks.

Coast.—At Kormantan the character of the coast again changes, turning suddenly to the eastward and preserving an unbroken line of straight sandy beach for 15 miles to the village of Kuntamkweri. In this extent the approach to the coast is clear, without any offlying rocks, and the soundings are regular, over a bottom of fine sand and broken shells. The coast is very low, and on its margin are situated 10 villages, each standing in a dark clump of coconut trees.

There are also a few streams, of which the Amisa and Nakwa are the largest. The former is said to come from a long distance in the interior, its source being close to that of Busum Prah River, which enters the sea near Chama. In April the current of the Amisa was found to be just strong enough to force a small channel through the sand not sufficiently wide for a canoe to enter, but it is said to be

deep within. Nakwa River, 5 miles farther eastward, spread into a lagoon inside the beach in April, but in May it opened a channel and discharged a large volume of water.

At Emini (Imuna) and Serfampan (Sasra) there are salt-water lagoons, and from behind these villages the land begins to rise. About 3 miles 355° from Nakwa there is a peaked hill named Brabra Pow, 432 feet high, and a hill lying 7° from Kuntamkweri, which is 380 feet high, is visible from the tower of Fort William at Cape Coast Castle. Most of this part of the coast is cleared of trees and covered with long grass.

Tantamkweri Point.—Two miles of alternate rock and sand extend from Kuntamkweri to Tantamkweri Point, where there is a native village named Tuam; the landing there is difficult. The old castle of Tantamkweri, standing on the crest of a rocky hill $\frac{1}{4}$ mile eastward of the point, has long been abandoned, and is now a complete ruin covered with jungle; it is easily recognized, having (in 1885) a large tree growing apparently in the fort.

Babli Point, 1 mile northeastward of Tantamkweri Point, is a large black rock, on each side of which there is a good deal of foul ground and a stagnant lagoon, and $\frac{1}{4}$ mile inland from the point the village of Deggu appears on a rising ground near a grove of tall trees. Kwaben Hill, $3\frac{1}{4}$ miles 7° from Deggu, is table topped, 521 feet high, and makes an excellent mark for this coast. Farther inland there are four other hills, known by the names of the four cardinal points of the compass.

Gamma (Mumford).—From Babli Point the coast to the eastward is formed by several small sandy bays and points, with some detached rocks about them, but not extending more than 150 yards from the shore. The town of Gamma stands on the eastern part of a high double point of rock, $2\frac{3}{4}$ miles northeastward of Babli Point, with a lagoon in the valley 1 mile westward of the point. One mile northeastward of Gamma, and 400 yards offshore, there is a rock which breaks, with $2\frac{1}{2}$ fathoms of water close round it.

Shoal.—The steamship *Tibet* (1899), drawing 19 feet of water, touched lightly on what is probably a rocky head on a shoal bank extending $\frac{3}{4}$ mile offshore, with Gamma Point bearing 287° , distant about 1,200 yards, and Appam Point 36° .

Appam Point, $2\frac{1}{2}$ miles 53° from Gamma, appears like a small hummock on the eastern side of a saddle-shaped hill, which, rising immediately from the sea, is surrounded by rocks above and below water; these rocks extend nearly $\frac{1}{2}$ mile along the coast on either side, and about 400 yards to the eastward.

On the hummock stands a white ruined fort with a flagstaff; westward of the fort and near the beach is a white house. These two objects help to distinguish the place.

Communication.—The steamers of the British & African Co. call, and there is a telegraph station at Appam.

Landing.—The bay northward of Appam Point is smooth though shallow, being sheltered by the point and its surrounding rocks. The landing is good and dry when a canoe is employed, but too shoal for ordinary boats. The little Kotoko River has its entrance at the head of the bay, about 400 yards northward of the hummock, but the bar is passable only by canoes; inside the bar the river spreads into a salt-water lagoon.

Wreck.—The wreck of a bark, with a depth of about 3 fathoms over the hull, lies sunk in the anchorage in $5\frac{1}{2}$ fathoms of water, about 2,100 yards 109° from Appam Fort. This position is doubtful.

Tides.—Springs rise 4 feet; neaps 3 feet.

Rocks.—A sandy beach extends northeastward of Kotoko River for $1\frac{3}{4}$ miles to the rocky point of Kitchoru; and in the space between there are some detached rocks, which extend nearly $\frac{1}{2}$ mile from the shore, with a 2-fathom channel inside. Two of them, named by the natives the Assakri, are always above water and appear black.

Eastward of Kitchoru Point there is a long ledge of rocks, on which the sea breaks heavily; it is $\frac{1}{4}$ mile in breadth and fronts the beach for the distance of 1 mile to the foot of Mamkwadi Hill. The natives of Mamkwadi village ply their canoes among these breakers with great dexterity, and beach and launch them freely under the shelter they afford.

Mamkwadi Hill is a bold highland, with a steep ascent from the sea; its highest point at the southeastern extremity of the ridge is 670 feet. The Mamkwadi Range, the highest point of which is 933 feet high, is nearly parallel to and about 5 miles from the coast; the hills are covered with vegetation, and the trees on some of them are of large dimensions, forming conspicuous objects for a long distance on either side, and an excellent mark for recognizing the different places along the coast.

One mile eastward of Mamkwadi Hill the little Munni River forces a shallow passage through the sand; but in the rainy season it is the outlet of a large body of water.

Winneba Point, low and rocky, is 7 miles 68° from Appam Point. The town of Winneba stands on the beach of a small bay on the eastern side of the point, and above the town are situated the ruins of a fort. Two whitewashed trading houses on the point are easily seen when approaching from the westward. The neighboring country is rather low, but undulating, and with more brushwood than forest.

Communication.—The steamers of the British & African Co. call monthly, and there is a telegraph station at Winneba.

Dispensary.—There is a free dispensary maintained by the Government.

Landing.—At low water the landing here is good for canoes, being sheltered by the reefs extending from the point, which are then uncovered, but at high water it is very difficult.

Ainsu River falls into the sea 1 mile northeastward of Winneba Point, and being somewhat sheltered by that point, as well as by the adjacent rocks, its mouth is always open.

Coast.—From Ainsu River a straight sandy beach extends eastward for $6\frac{1}{2}$ miles to Meredith Point, where the coast again becomes rocky and turns more to the northward. In this space the coast is low, but behind it the land rises into gentle hills, the highest of which, Mount Senia, is 374 feet high. These hills are generally bare of trees but covered with low stunted bushes.

Long Hill, $6\frac{1}{2}$ miles 322° from Meredith Point, is 554 feet high, and has a grove on its summit.

About 10 miles, 5° , from the same point a hill with two remarkable hummocks is 770 feet high. Its local name is Mount Appra, but to seamen it is generally known as the Paps.

The Camel's Hump, 6 miles 334° from the Paps and 16 miles inland, is a still higher range, extending 6 miles in a northeast and southwest direction. Near the center of the range, one part of it, which assumes the shape of a camel's hump, is nearly 1,200 feet high. All the hills seem to rise out of an extensive plain.

Barako Point, $\frac{3}{4}$ mile northeastward of Meredith Point, is moderately high and rugged, of a dirty red color, and on an eminence above it stands the native town of Senia, as well as the abandoned fort of Barako, which is in a state of rapid decay and not easily seen.

Senia is large and much cleaner than most of the towns on this coast, with three or four white European houses. It is said that vast numbers of large baboons infest this vicinity and commit great depredations.

Coast.—The coast northeastward of Barako Point is formed by small sandy bays and rocky points, at the base of which lie a few rocks. The land rises to a ridge of moderate height, which lies parallel to the coast as far as Fetta Bay.

Fetta Point, 2.7 miles northeastward of Barako Point, is sandy on the western side, but to the eastward a rocky cliff turns at right angles to the coast and forms a bay $\frac{1}{2}$ mile across, at the head of which the village of Fetta stands upon rising ground, with the little Kaku River winding around its foot. When closed in the dry season this river spreads itself into a lagoon beneath the town.

The village of Fetta consists of 40 or 50 mud huts, with a population of about 400, who appear to live principally on fish; the ground near is very little cultivated.

Off Fetta the water is rather shoal, there being a depth of less than 5 fathoms at 1 mile from the shore.

Supplies.—There is no good water in the place and other supplies are scarce, but a few fish can be procured by hauling the seine in the river, and turtle are occasionally caught.

Landing.—The landing place is the sandy beach at the foot of the cliff under the village, the rocks off Fetta Point breaking the force of the swell. Under ordinary circumstances landing is practicable for a whaleboat.

Coast.—At $\frac{1}{2}$ mile northeastward of Fetta Point a reef projects about $\frac{1}{4}$ mile from the shore. The remainder of the coast is clean as far as Nianyano Village, which stands among a grove of high trees 4 miles northeastward of this reef. At the foot of the village a little river passes from behind a small rocky point into the sea. A few rocks lie close off the mouth of the river, and from here a beach, but slightly curved and everywhere safe of approach, extends for 12 miles to Akkra.

The country around Fetta is more open than at Elmina or Cape Coast Castle. About 2 miles eastward of Nianyano Village the remarkable hill of Dampa, 376 feet high, will be observed close to the shore. Its name among the traders on this coast is the Cook's Loaf. This hill is the western termination of a range of high land, lying in a northeast and southwest direction, and which, though it appears to have many breaks in its continuity, steadily increases in height from the coast.

At 2 miles from Dampa Hill this range is 800 feet high; at 17 miles, 1,352 feet, and at 22 miles, 1,562 feet, whence to the northeast it falls to 1,435 feet, but everywhere appears to be covered with forest. Westward of this range, and about 18 miles 357° from Dampa Hill, and 325° , distant about 20 miles from Akkra, there is a conspicuous hill known as Akem Peak, apparently isolated, and about 1,000 feet high.

The part of the range lying 2 miles northward of Dampa Hill is a table-land, and round its eastern extremity Sekum River winds down to the sea, which it enters through an open mouth; the surf, however, was too high at the time of the survey for a boat to enter. The stream is supposed to be the eastern boundary of the Fanti country.

Akkra (Accra).—Akkra Point is formed by a large rock, whose southern extremity (on which Jamestown Fort is built) rises only 36 feet above high water. The fort is nearly square, about 145 feet each way, with regular bastions, and has a tall flagstaff. Shoals

extend in an easterly direction for 900 yards from Jamestown Fort, and in a southeasterly direction the 3-fathom curve is 600 yards from it.

Light.—From a red tower, 18 feet high, on the western bastion of Jamestown Fort, is exhibited, 50 feet above high water, a fixed white light, visible 10 miles.

Town.—The town, extending northeast and northwest from the fort, consists of several narrow streets of native dwellings and some good houses belonging to the English merchants. Westward of the town there are some brackish pools of water, which stagnate after the rainy seasons.

There is a constant communication between Akkra and the Ashantis, bringing from the interior the greater part of the gold which is exported from this place. The country, as far as the high range of hills recently mentioned, is a fine open plain with a light soil, covered with shrubs and not much heavy timber. The distant hills are covered with dense forest, but the valleys between them are described as fertile and beautiful.

Between 600 and 700 yards northeastward of Jamestown Fort are the ruins of the fort of Crevecœur (Usher Fort), standing upon a rocky cliff about 50 feet above high water; the fort appears to have been of an octagonal form, with a large inclosed space, probably the slave yard, adjoining it.

The castle of Christiansborg, about 2 miles northeastward of Jamestown Fort, stands upon a rocky point, about 35 feet above high water, its principal part approaching the form of a square, of about 190 feet in the side. On each side of it the beach forms a small sandy bay, and in front there are a few ledges of rock, on which the sea breaks heavily.

There is a good road between the castle and Akkra, with trees on each side, which render it an agreeable walk or drive, and midway is Victoriaborg, where are the public offices, post office, etc.

The native town, which lies northward of the castle, has not a very clean appearance. To the westward of it there is a martello tower on a small sandy eminence, and also a black wooden windmill. Farther inland there are a few detached dwellings.

Harbor works.—A breakwater and a jetty are nearing completion at Akkra, to the southward and eastward of Jamestown Fort; the rocks in the vicinity are being removed by blasting. When complete the former will have a total length of 800 feet and the latter of 270 feet. The rocks in the neighborhood of the jetty will be removed so as to give a depth of 5 feet alongside it at low water.

Light.—A small fixed red light is exhibited from a crane at the extremity of the works in progress at the outer end of the break-

water; to avoid rollers boats should not pass within a distance of 50 yards of the end of the breakwater.

Flagstaff.—A conspicuous flagstaff is erected at 300 yards north-eastward of Jamestown Fort.

Zahrtman Mount, a solitary hill in the plain, about 540 feet high, is 6 miles 354° from Christiansborg.

Communication.—Mail steamers of the British & African Steam Navigation Co. and of the African Steamship Co. leave England weekly for Akkra and other ports on the Gold Coast. There is a German line from Hamburg monthly, and French steamers to and from Marseille call irregularly.

Railway.—A railway is intended to connect Akkra with Mon-goase, and possibly Koforidua.

Supplies.—Water and other supplies are scarce.

Landing.—A few detached rocks lie round the base of Jamestown Fort, and the landing place is on a small sandy beach, scarcely sheltered by those rocks. The surf is so high, and it requires so much skill as well as local experience to pass through these dangers with success, that ordinary boats should never attempt to land; but the natives in their canoes have, from long practice, acquired the skill of landing and embarking with ease and safety. There is also a landing place near the slaughterhouse, about 800 yards northeastward of Jamestown Fort.

Signals.—Ships at the anchorage can communicate by the International Code with Jamestown Fort or the Government house flagstaff at Christiansborg.

Time signal.—A time signal is made by a flag and gun from the telegraph company's office. The flag is dropped and gun fired at 23 h. 00 m. 00 s. Greenwich mean time. Greenwich time is received daily, Sundays excepted, at 10 a. m. from London by post-office chronograph, but, being relayed through several stations, is not exact.

Hospitals.—There is a public hospital maintained by the Government, and having 7 beds for Europeans and 25 for natives; also a hospital for the treatment of contagious diseases, and a military hospital for the Hausa constabulary.

At Aburi, 26 miles from Akkra, and elevated 1,400 feet above high water, is a sanatorium, which is open to patients from British naval vessels. It is in telegraphic communication with Akkra, the food and water are good, and the temperature ranges from 60° to 86° F.

Submarine telegraph cables.—Cables from Sierra Leone, Grand Bassam, Kotonu, and Lagos are landed near Akkra.

Buoy.—A red spherical buoy, surmounted by staff and globe, and marked "Cable," is established at 1,500 yards 116° of Jamestown Fort, and marks the position of the submarine telegraph cable. (Reported missing in 1914.)

Vessels must not anchor on or near a line joining this buoy with Jamestown Fort.

Anchorage.—One mile southward of Akkra there will be found a depth of 5 fathoms; at $1\frac{1}{2}$ miles, 7 fathoms; and at 2 miles, 8 to 9 fathoms. During the dry season vessels may anchor in 5 or 6 fathoms, but during the rains it will be prudent not to approach nearer than 8 fathoms.

Caution.—Vessels should not anchor eastward of a line of the church and quarry bearing 325° .

Earthquakes.—In 1863 the town was destroyed by earthquakes, and on August 13, 1883, several severe shocks were experienced.

Soundings.—The soundings along the whole coast from Cape Coast Castle to Akkra are regular, shoaling gradually toward the shore, up to 3 fathoms, which is as close as boats can generally approach the surf. The bottom is fine dark gray sand, with broken shells, and sometimes mud. By keeping outside the 7-fathom curve all dangers will be avoided.

Tides.—At Akkra it is high water, full and change, at about 4 h. 46 m.; springs rise 4 feet, neaps 3 feet.

Coast.—From Christiansborg a sandy beach, with a few rocky patches upon it, extends eastward for 2 miles to the village of Labadi, which stands on a little rising ground in the center of a grove of high trees, nearly $\frac{1}{2}$ mile from the beach. At 3 miles farther eastward there is a large native town named Tassi, which has a large white house fronting the center of the town, also one or two white houses on either side, rendering it easy of recognition. The land in its vicinity is flat for several miles inland, and covered with grass and a few clumps of low trees. To the westward of the town may be seen the remains of Fort Augustenborg.

Shoal.—A shoal, on which there is a depth of 3 fathoms, lies 4 miles 83° from Akkra Point. It is nearly 1 mile from the nearest shore at Labadi.

Coast.—Northeastward of Tassi the coast line is an indented sandy beach with a few rocks off the projecting points and ledges at considerable intervals apart, but neither projecting more than $\frac{1}{4}$ mile. The country is open, with occasional trees or groves, instead of continuous forests, and the native villages are smaller and not so numerous as those to the westward.

Little Ningo.—This village, lying 2 miles northeastward of Tassi, stands on rising ground, 670 yards from the shore; and Temma, situated 5 miles farther northeastward, has a similar position, with a green slope to a bay on its eastern side. On that slope there is a large, round-headed, dark tree, standing conspicuously alone, and helping to identify the place.

Greenwich Rock.—In the space between Tassi and Temma villages, about $1\frac{1}{2}$ miles southwestward of the latter, there is a small black rock on the eastern extremity of a ledge which fronts the shore; it lies nearly 300 yards from the coast and very near the meridian of Greenwich.

Grove Point.—About $1\frac{1}{2}$ miles eastward of Temma village the beach forms a point from which a reef projects to the southward; and $1\frac{1}{2}$ miles northeastward of this is Grove Point, with a similar reef projecting to the eastward.

Vernon Bank.—A narrow spit extends 12 miles in an easterly direction from Grove Point, having an angle of about 17° with the general trend of the shore. Its formation is very irregular, some casts of the lead showing sand, others gravel, stones, and narrow ledges of rock. The average depth on it is between 5 and 6 fathoms, and on the shoalest part, which is 2 miles 118° from Poni, there are 4 fathoms of water.

There is a depth of 10 fathoms close-to on its southern side, and on the northern side 8 or 9 fathoms, with regular soundings from thence to the shore, over a bottom of brown sand with minute broken shells. It is believed that there is no danger on any part of this bank, but vessels would do well not to approach it within a depth of 12 or 13 fathoms.

Poni, a town situated in a bay $1\frac{3}{4}$ miles northeastward of Grove Point on rising ground $\frac{1}{4}$ mile from the beach, can only with difficulty be made out through a grove of trees. Eastward of Poni is a conspicuous tree standing by itself on top of rising ground close to the shore. Two ledges of rocks lie at the foot of the hill, but they are of small extent.

Landing.—The usual landing place for Poni is on the beach close northward of Grove Point, the reefs off which afford some little shelter.

Prampram.—Northeastward of Poni, distant $3\frac{1}{2}$ miles, the town of Prampram stands, like Poni, near the summit of a low hill, and is $\frac{3}{4}$ mile from the beach. It may be recognized in approaching from the eastward by three white houses, about halfway between the town of Prampram and the landing place. The ruins of Fort Vernon are near the beach.

Communication.—The British & African Steam Navigation Co.'s steamers call outward and homeward, and there is a telegraph station at Prampram.

Supplies are fairly plentiful; live stock, beef and mutton, occasionally, also turtle. Various kinds of game can be shot in the neighborhood.

Landing.—The landing place is about 1,350 yards southeastward of the upper town on a clear part of the beach between two rocky

shoals, which extend a mile on each side and on which the sea breaks heavily. The white house of the district commissioner, with a flagstaff, and a white store, both of which are on the beach, sufficiently indicate the landing place. Landing is practicable only in surfboats.

Anchorage may be had $\frac{3}{4}$ mile from the shore in $6\frac{1}{4}$ fathoms 162° from the commissioner's house.

Ningo River.—Great Ningo is $4\frac{1}{2}$ miles 64° from Fort Vernon, and the beach between is fronted by two rocky shoals.

Ningo River, though small, is said to be always open and navigable for canoes whenever the heavy surf which rolls in upon the bar allows them access; its entrance is very narrow, between two low sandy points. On the eastern point stands Fort Fredensborg, which shows as a large white ruin in a grove of tall trees.

Country.—The country immediately inland of the part of the coast northeastward of Tassi, and to within 1 mile of Ningo River, is an extensive plain, of pleasing appearance, partly open and partly diversified with groves of large trees, but covered neither by heavy forest nor unhealthy jungle. It contains many hills, among which are the Krobo Hills, a picturesque group with a singular outline, rising to the height of 950 feet, about 12 miles inland.

Other hills will be seen to the northeastward, one of which from its form was named the Abbey Dome; and the well-known peak of Ningo Grande, 18 miles northward from the mouth of Ningo River, attains the height of 1,431 feet and forms an excellent landmark when approaching the coast between Akkra and Cape St. Paul from the southward.

Coast.—For nearly 4 miles eastward of Ningo River the beach is fringed by a broad ledge of rocks, over which the small River Mumo discharges, and being protected by them, its mouth is probably always open. The edge of this ledge is nearly steep-to, there being a depth of 4 fathoms as close to it as a boat can approach; the heavy surf rolls over it incessantly. These rocks are the last seen upon this coast when proceeding to the eastward.

From the above ledge of rocks to the entrance of Volta River there is an uninterrupted beach 26 miles in length, and so slightly curved as not to recede more than 2 miles from the straight easterly course between its western and eastern extremities. For 5 miles eastward of the ledge a low clay cliff rises immediately from the beach, but it then falls into a ridge of sand with a few bushes upon it.

This ridge is not more than 12 or 15 feet in height, and continues for 13 miles to Ukko village, separating, throughout that space, the sea from the great salt water lagoon and swamps which are produced by the overflowing of the Volta. From the masthead the whole face

of the country appears a wooded morass as far as the eye can see; and the surface of the lagoon is broken by large tracts of swamps, some of which are covered with grass, and others by jungle, with here and there a few high trees.

Ukko.—The village of Ukko is about 250 yards from the beach, near the eastern extremity of the lagoon, and surrounded by coconut trees, which, as there are no others near it on either side, give it the appearance of an island when seen from a distance. About $\frac{1}{4}$ mile eastward of Ukko the shore, though intersected by swamps, is again covered with verdure, and thick groves of palm trees mixed with jungle, which extend to the banks of the Volta. There appeared to be other villages in the bush as well as on the beach.

Addafoa, about $1\frac{3}{4}$ miles westward of the entrance to the river Volta, is a native village with some European merchants' houses. The village, built in a hollow, is easily recognized by the mission house, a flat-roofed building standing on the western extremity of the settlement; there is also a church and post office.

Communication.—Elder, Dempster & Co.'s steamers call, and there is telegraphic communication.

Dispensary.—There is a free dispensary, which is maintained by the Government.

Anchorage.—There is a fair anchorage off Addafoa; a good berth is in $6\frac{1}{2}$ or 7 fathoms of water, over sand, with Basel Mission House (a long white building near the beach) bearing 345° . It is not prudent to anchor nearer the shore, as the water shoals quickly and at times the swell is heavy.

Landing is very bad, the surfboatmen often refusing to go out.

Volta River.—This river is said to come from a long distance in the interior, separating the former kingdoms of Ashanti and Dahomey, and about 40 miles from the sea passes near the northern base of Ningo Grande Peak; thence it takes a southeasterly direction toward the coast, and enters the sea between two low spits of sand 18 miles westward of Cape St. Paul.

The river begins to rise early in June and commences to fall about the middle of October, being at its lowest about March and highest in September.

In December, 1887, it was observed that the gray waters of the Volta extended to the extremity of Cape St. Paul, where they suddenly ceased.

At Amidika, nearly 50 miles within the entrance, where the stream is 670 yards wide, the difference of level between the high and low state of the river is about 45 feet; at the entrance, owing to the large expanse over which the waters are spread, the difference is not more than 4 or 5 feet.

Sandy Island, at the entrance of the Volta, rather more than 1 mile in length in a north and south direction, has some villages on its southern part, but the northern portion is thick brush and trees. It is situated between the two entrance spits, and the river then expands into a wide basin with several islands, most of which are covered with thick bushes and trees with some patches of cultivated land. Kennedy Island, about 3 miles in length in a north and south direction and thickly wooded, lies on the western side of the above-mentioned basin.

About $\frac{1}{2}$ mile northward of Palm Point, on the eastern side of the river, is the entrance to the creek landing to Kitta Lagoon, and about a mile northward of the entrance points on the eastern bank there is a dark grove, which makes like a bluff headland. At 2 miles to the eastward of this grove there is another in the form of a conical hill, and on the western side of the river there are three other high groves, the trees in the immediate neighborhood of Volta River attaining an unusual height.

Navigability.—A vessel drawing 6 feet of water can ascend to Amidika from July until November, but during the remainder of the year a vessel of that draft would experience difficulty in proceeding to Duffo Island (40 miles within the entrance), and could not ascend above that point.

Big Adda is a large town on the right bank of the Volta, about 4 miles from its mouth, and near it is situated the fort of Kongenstein.

The principal merchants reside at a town locally known as Riverside, situated on the right bank of the Volta, $1\frac{1}{2}$ miles within the western entrance. The produce brought down the river is landed at Riverside and conveyed across to Addafoa, on the seacoast, for shipment.

Foa is situated on the bank of the river close to Riverside and is marked by a large clump of palm trees.

Bar.—The bar, which is about 200 yards wide, lies between the points of two tongues of very heavy breakers, the western extending $\frac{3}{4}$ mile southeastward from Dolben Point, the eastern nearly the same distance south-southwestward of the southern point of Sandy Island. A depth of 9 feet at low water, springs, was found on the bar in 1897.

There is a channel, with a depth of 5 feet, between Sandy Island and Palm Point, but the shoal southeastward of Sandy Island is extending, and between Palm Point and the southeastern extremity of Sandy Island the surf is generally too heavy for a boat to cross.

Bellbuoy.—A bellbuoy is moored off the bar on the western side of the line of entrance, but too much dependence must not be placed upon it.

Directions.—When coming from the westward the mouth of the river may be known by a temple and a large building of two stories, which is also seen from the eastward, but is then, on certain bearings, hidden by the tall coconut trees. The mouth of the river is clearly seen when bearing about 300° , the entrance being between Dolben Point and the western extremity of Sandy Island; from Dolben Point for about $\frac{1}{2}$ mile to the westward there is a separate clump of trees, which appears like an island when the point bears 339° .

Two marks, erected on the western side of Sandy Island, in line, bearing 0° , lead across the bar, but no vessel should attempt to cross, except in fine weather and with the assistance of a pilot, as the bar is liable to shift. The bar should be attempted only on the flood, the best time to cross being one hour before high water. In crossing the bar the set of the tidal streams should be carefully watched; the flood sets over the western breakers and the ebb over the eastern.

Telegraph cable.—A telegraph cable from Riverside to Palm Point is laid nearly in mid-channel as far as Sandy Island, which it crosses.

Tides.—It is high water, full and change, at Riverside at 4 h. 20 m.; springs rise 4 feet in June. At the mouth of the river (in February) springs rise from 5 to 6 feet, neaps 3 feet.

The range of tide is affected by the state of the river; when at its lowest (about March) the range at springs is sometimes as much as 6 feet; as the river rises the strength of the stream increases and the tides have not so much effect; when at its highest (in September and October) the range at Riverside is reduced to 1 foot or less.

Caution.—When passing the entrance of Volta River, allowance should be made for the indraft on the flood; the soundings should not be reduced to less than 12 fathoms, as in 10 fathoms a vessel would be almost within the influence of the breakers.

At 6 miles off the mouth of the Volta as little as 10 fathoms of water has been found.

Coast.—From the mouth of Volta River a straight clean beach trends eastward, and for 7 miles the land is covered with a dense forest, principally of fan palms.

Atoka, once a notorious slave mart, is situated 8 miles eastward of Volta River and $\frac{1}{2}$ mile from the beach. There is a gap in the uniform line of forest at Atoka, where there are a few straggling trees.

Current.—Between Cape Coast Castle and Whyda during July and August the current has been observed to be irregular both in strength and direction, setting to the westward occasionally with a velocity of $\frac{1}{2}$ knot an hour.

CHAPTER IV.

CAPE ST. PAUL TO CAPE FORMOSO—THE BIGHT OF BENIN.

General remarks.—The bight of Benin extends from Cape St. Paul to Cape Formoso, about 320 miles east-southeastward from the former cape. From that line, at two-thirds of the distance from Cape St. Paul, the curve of the shore recedes 95 miles to the north-eastward, where, at the head of the bight, is the entrance of Ajimo or Odi vista.

The length of coast in the bight is about 400 miles, forming a long monotonous range of beach, so uniformly low and flat that not a single inland eminence is visible from the offing; the elevation of the ground above high water is scarcely 4 feet in some places, and seldom exceeds 10, and even the most prominent clumps of trees do not rise to a height of more than 60 feet.

The coast from Cape St. Paul to Cape Formoso is composed of sand of a bright yellow tint along the western two-thirds of the shore line, and sand and mud along the eastern side of the bight, as well as on the margin of the estuaries of the numerous rivers. Any gentle undulations that may be discerned on the shore will prove to be only sand hills thinly covered with loam and densely covered with weeds and brushwood.

Here and there single palms and coconut trees may be seen or a group of huts with white conical roofs standing out in relief to the dense thicket or jungle background, while on the receding plain clusters of stately trees, when seen from the distance of 5 or 6 miles, present the appearance of green cliffs.

Near Kitta the trees are high and form large and distinct groups, gradually blending into a continuous line as far as Agweh, where the coast trees terminate, and the high beach is only here and there dotted with them. Between Great Popo and Whyda the beach is very bare, only occasionally rising into green hummocks.

From an offing of 12 miles and an elevation of 13 feet the whole shore dips below the horizon, so that throughout the bight of Benin there is no object which at that distance from the shore would enable a vessel to mark out any particular station or identify any one position. At 8 miles from the shore the aspect is entirely different from that at 4 miles, so that, until familiarized with the appearance of

every place, one station can be recognized only by tracking it from another, assisted by the chart.

Windward or western shore.—Jungle, with groups of trees, covers the whole of the windward or western arm of the bight, interspersed with numerous villages and detached huts. Throughout this long extent of coast the Lagos River is the one permanent opening or outfall for the lagoon waters, but there are several partial breaks in the sand hills through which the lagoons pour their swollen floods during the wet season; these breaks produce straight vistas, which appear like river openings, but across them the sand is heaped so compactly as to preclude any outfall during the rest of the year.

Leeward or southeastern shore.—The distinctive character of the leeward or southeastern arm of the bight is a continuous dense mass of trees, no longer fringed by a bright, sandy beach, but growing on the muddy high-water margin of the sea. The many rivers and creeks which form the delta of the Niger River are also a peculiar feature here.

On this part of the coast there are very few groups of huts or remarkable objects by which a vessel may identify her position; but it contains 13 river mouths, each possessing sufficient diversity of feature to be recognized. Much vegetable matter and silt is discharged from these at every ebb tide, discoloring the blue ocean water for the distance of several miles from the coast. This scum, which has a sickening odor, is frequently nearly 3 feet deep, and from its deep brown color so contrasts with the blue water of the ocean as to present a remarkably defined and frothy margin having all the appearance of a shoal. On approaching it a stranger would be much inclined to tack or anchor, but attention to soundings will save much unnecessary trouble, and when crossing its edge it will be found that, though its onward motion would sweep away a boat, it has no effect on a vessel of moderate draft.

Lagoon outfalls.—This discoloration of water, during the rainy season, extends sometimes as far westward as Godome and Whyda, and to a distance of 10 miles from the shore; while inshore the outfalls of the lagoons give the sea a light-green tint. This lagoon water breaks out through openings in the beach during the rainy season, beginning with the month of April and lasting until October. These outfalls, from Great Popo to the eastward, are all, except the permanent opening of Lagos, barred by sand between October and April, leaving no other indication of their positions than the remarkable vistas through the wooded belt which lines the shore.

Soundings along the windward portion of the bight may be classed in the following zones: At 1 mile from the beach there is a depth of 8 fathoms, fine light-brown sand, extending as far eastward

as Palma village; at 3 miles from the coast a depth of 10 fathoms is found with similar bottom; and at 6 miles from the beach, 12 fathoms over a similar description of sand. At the latter distance from the shore the sandy bottom changes into olive-colored and black mud with broken shells, and the water rapidly deepens to 200 fathoms at the edge of the bank, which, though only 6 miles southward of Cape St. Paul, lies 18 miles from the shore on the meridian of Lagos.

The average width of the bank of soundings to the 100-fathom curve is about 15 miles along the windward arm.

The unceasing deposit poured out from the numerous rivers on the southeastern arm of the bight accounts for the much increased breadth of the bank of soundings, the 100-fathom curve being found at an average distance of about 30 miles from the coast.

This broad bank of soundings affords a useful warning to the mariner when approaching the southeastern part of the bight, which is skirted with muddy shallows to such a distance that the surf on the coast is not heard when in shoal water. Along the western arm a vessel under sail may stand in to a depth of 8 fathoms.

Caution.—Even in the western arm, however, the lead should always assist the lookout, or the navigator might unexpectedly find his vessel within the influence of the coast swell and rollers, the action of which is sometimes experienced when $\frac{3}{4}$ mile from the beach. The tendency of the swell to set a vessel to leeward should be allowed for at the rate of $\frac{1}{2}$ knot an hour when shaping courses at night or in hazy weather by day.

Even steamers should not shoal the soundings below 8 fathoms when on the windward part of the bight, for unless the engines are occasionally stopped the roar of the surf will not be heard in time, though audible long before the foam can be seen in foggy weather. If there be no particular motive for hugging the shore at night along the windward coast, the best rule for preserving a 4 or 5 mile offing is to keep in a depth of 12 fathoms.

Anchorage.—Excellent holding ground is afforded throughout the whole of the Bight of Benin, from close inshore out to a depth of 15 fathoms, which will be found about 7 miles off the windward coast and 12 miles from the leeward coast. The bottom throughout is of stiff black mud with broken shells covered by sand, and is well adapted for working the stream anchor with a bower cable, as the stream chain might not sustain the strain of the irregular swell, which occasionally assumes the form of rollers.

Outside the depths of 15 and 20 fathoms the bottom is composed of so soft a compound of olive-colored mud, broken shells, and decayed vegetable matter as to require a bower anchor. Inshore although the lead arming may indicate nothing but sand (which covers the bottom to the depth of a few inches), yet from Cape St. Paul to

Avon Deep the anchor will instantly bury itself up to the crown in mud.

Offshore anchorage.—Anchoring anywhere in the Bight of Benin must be prompted by necessity and not from any hope of tranquillity, for as the vessel lies more or less across the swell, according to the strength of the current, unceasing heavy rolling is the sure result.

If requisite, however, for the purposes of transporting stores between vessels, choose a 12-mile offing at least; and, if consistent with the purpose in view, select the windward arm of the bight, and as far westward toward Cape St. Paul as possible, for the swell there is not so heavy and the climate is less disagreeable than it is when farther eastward. In fact, several dry sunny days together during the rainy season may be enjoyed to the westward of Lagos, while it is incessantly raining to leeward.

Directions for anchoring.—Along the leeward arm of the bight a vessel should anchor 9 miles off the coast in depths of from 10 to 12 fathoms, not only to avoid shoal water, but also on account of the heavy ground swell that is perpetually rolling in. With the land not sighted, the vessels' head offshore, and the soundings decreasing below 12 fathoms, it will be advisable to anchor; more especially if supposed to be opposite any of the river entrances, as the indraft of the flood tide extends for distances of 4 and 5 miles from the shore.

Landing—Canoes.—However practicable the surf may occasionally appear, landing should not be attempted anywhere between Cape St. Paul and the termination of sandy beach about 5 miles eastward of Ajimo, except in the local canoes, and even they require much skill in handling and the assistance of extra hands to receive and haul them up as well as to launch them. The signal gun, with ensign at the fore, will be at once understood by the natives as a signal for a canoe, though, perhaps, tardily obeyed. The different factories will supply surfboats. The part of the canoes reserved for passengers is at their bow, where 3 or 4 feet of housing is formed to keep out the sea when thrusting through the surf in the operation of launching, and it affords the only chance of keeping anything dry. More than two persons can not well occupy this limited space, and other passengers must sit on the thwarts between the double-banked paddlers, who themselves sit obliquely on the gunwale with their faces toward the bow; the padrone or coxswain steers with a paddle. In disembarking the passenger may sit or stand in the fore part of the canoe, in order to be ready to jump on shore quickly, lest he be swept out by the succeeding surge.

In embarking, the canoe is made ready with the prow outward and hauled up on the beach, the crew being ranged on either side reaching down to the thwarts so as to lift the boat out of the sand dock,

as well as to launch her, which they begin to do, with the assistance of the beachmen, as soon as the second of three heavy waves has broken.

The steersman now watches with experienced eye for the following swell, when, with energetic exclamations and gestures, the canoe is floated off on the expended wave, each man jumping into his place with his paddle so simultaneously and expertly as not to overbalance the boat.

The head is then dexterously kept to the sea, but the canoe is not propelled forward till the steersman again gives the word; and some time a long interval is occupied in watching the swell and in moving a little backward, forward, or perhaps sidewise, which is cleverly done by a sculling motion of the paddles without altering the direction of the head, which must be kept toward the surf.

Many anxious minutes are passed in this way, till the state of the outer swell seems all at once to justify a dash, and then, with great urging at one moment and expertly checking at another, the buoyant little boat is passed from ridge to ridge.

It is always prudent to have the ship's boat waiting at the back of the surf, and it is advisable to head up in a small cask such things as it may be desirable to pass dry through the surf.

Very few accidents occur to these canoes when freighted with passengers only, but with cargo they often capsize, especially when loaded with such top weight as casks of palm oil and oxen, or when landing crates and dry goods in cases.

Watering.—It is not advisable for vessels to obtain wood and water anywhere in the bight, nor can there under ordinary circumstances be any occasion to do so, as Fernando Po and Princes Islands are within three days' sail to the southward. In cases of necessity, however, the natives will bring off water, and merchant vessels generally so provide themselves. With attention an ample quantity of rain water may be saved during two-thirds of the year for cooking and washing purposes.

Smokes.—The land is frequently obscured by exhalations, locally termed smokes, which in the dry season, especially from November to May, prevail throughout the entire bight, but with less perplexing effects on the windward side, where the bright sandy beach, with its fringe of surf, is easily seen through the haze, or the breakers are heard in time to warn the mariner of his proximity to the shore.

The smokes last usually for about three hours after sunrise, giving place at about 10 a. m. to the sea breeze.

Tides.—The beach indicates a vertical range of tide of about 4 or 5 feet, but the surf is so heavy and incessant on the shore and the swell so constant in the offing that it precludes actual measurement

of the rise of the tides on the windward coast. Along the leeward arm, where the water is smooth within the river bars, the tidal establishment at each river mouth has been obtained. The navigator should therefore compute when to allow for the influence of either ebb or flood streams, which generally extends to a radius of from 6 to 9 miles from the mouths of these rivers, more especially if intending to send a boat across any of the bars.

Tidal streams.—The velocity of the flood stream is much less than that of the ebb, as might naturally be expected from the vast outfalls of the freshets being added to the discharge of tidal water, the combined effects of which are expended over a considerable radius with a velocity of 3 knots an hour at the mouth of a river and 1 knot an hour in the offing. At half ebb a volume of turbid, brownish water, upon which are floating uprooted trees, bushes, leaves, and jungle, is discharged.

Cape St. Paul.—From Atoka the coast line bends gradually to the northward, toward Cape St. Paul, 3 miles northeastward of which is the village of Weh, which is difficult to be seen. Thence the coast sweeps round rapidly in a northerly direction for 5 miles to the town of Kitta. The curve of the shore being so gentle, it is difficult to say what part of it should be named Cape St. Paul. That name is, however, usually applied to the coast near Weh.

From Atoka to Kitta, or in other words, the whole sea face of Cape St. Paul, is only a narrow ridge or barrier of sand, separating the sea from the great Kitta Lagoon, which receives the overflowing water from the Volta River and extends eastward for many miles. On this narrow strip of sand there are several native towns.

After passing the mission house at Addafoa and proceeding to the eastward about 2 miles distant from the shore the most prominent objects are the lighthouse and a clump of trees on Cape St. Paul, and, when abreast of these, two very prominent whitewashed factories may be seen at the eastern extremity of the town of Kitta. The flagstaff of the fort, situated to the left of the factories, should then open out.

Light.—From a gray pile lighthouse, 83 feet high, erected on the beach at Weh, Cape St. Paul, is exhibited an intermittent white light. The light is elevated 74 feet above high water and is visible 14 miles. For details see Light List.

Weh.—At this village canoe communication may be effected with the shore and plenty of stock obtained. The position of the village may be known by the lighthouse, and a little eastward of this there is a small cluster of palms, and about $\frac{1}{2}$ mile farther eastward a small village, which is the only one seen in rounding the cape.

Anchorage.—Vessels desirous of communicating with the shore at Weh may anchor at any required distance from it, as there are no

offlying dangers; the soundings are regular, with a bottom of fine white sand near the beach and mixed with shells and mud farther out.

Soundings.—With Cape St. Paul bearing 322° , the bank of soundings to the 100-fathom curve extends 6 miles from the land; and on the meridian of the cape it is very flat, dropping suddenly at a distance of 9 miles from 22 to 200 fathoms.

Jella Koffi or Jellu-koffi, situated 3 miles northeastward of Cape St. Paul, or midway between that cape and Kitta, when made from the eastward, appears as several islands, the western of them being the clump of trees among which the huts and houses are built. The position of Jella Koffi is known by two large white posts which stand at the foot of a cutting into the wood and mark the entrance to the village.

Supplies.—Cattle and poultry are abundant in the vicinity of Cape St. Paul and may be procured without difficulty from the natives at Weh, Jella Koffi, and Kitta.

Landing.—The surf is much too high along the beach for ordinary boats, but at Kitta the landing is easy at times.

Anchorage.—A large vessel might anchor in $6\frac{3}{4}$ fathoms of water over sand, with Kitta Fort bearing 351° and Jella Koffi flagstaff 277° .

Caution.—At night care should be taken not to mistake the lights in two or three houses situated a mile northward of Jella Koffi for those of the village.

Kitta.—From Jella Koffi the shore trends northward for $2\frac{3}{4}$ miles to Kitta, a large and conspicuous village where there is a fort. The fort is obscured from view on most bearings, but a large square bungalow close to it with a flagstaff on its western side makes a good mark for anchoring. Just north of the fort there is a magazine, painted yellow, with a white-roofed sentry box near it.

Four large houses on the beach, the southern with a very white roof and a conical roof to its porch, serve also to identify this place; the northernmost house, a hospital, has also a white conical roof when seen from the eastward.

From Kitta to 1 mile westward of the white house, almost entirely obscured by trees and apparently in ruins, which stands at the foot of a wooded eminence with very gradual slopes, the beach is almost clear of trees. A number of huts lie on the southern side of the fort, and there are several narrow streets with little picketed inclosures, some of which appear to be neatly kept. The edge of Kitta Lagoon is within 350 yards of the fort.

Communication.—The British & African Co.'s steamers call, and there is a telegraph station at Kitta.

Supplies.—The natives at Kitta are extremely civil, and will procure supplies if required.

Hospital.—The Government maintains a public hospital at Kitta.

Anchorage.—To facilitate communication with Kitta a vessel should anchor about $\frac{1}{2}$ mile offshore, in 7 fathoms; otherwise in 10 fathoms, 2 miles off, with the fort bearing 298° .

Owing to the trend of the coast vessels at this anchorage lie head to the swell.

Caution.—It must be borne in mind while at anchor at Kitta or on this part of the coast that tornadoes often blow onshore.

Vessels intending to stay should anchor in not less than 6 fathoms, as the rollers may come in unexpectedly and sometimes heavily.

Soundings.—The 100-fathom curve lies 9 miles off Kitta on a 141° bearing, the soundings abruptly dropping from 38 fathoms, over black mud, to 108 fathoms.

Coast.—The coast for upward of 100 miles from Kitta is low and flat, presenting to the view a line of green brushwood with occasional large clumps of palm trees, and a yellow sandy beach on which the surf breaks heavily.

From Kitta the coast line trends in a straight line northeastward for $8\frac{1}{2}$ miles to Elmina Chica, and, except for a $2\frac{3}{4}$ -fathom spot about $1\frac{1}{4}$ miles northward of Kitta, there are no dangers at $\frac{1}{2}$ mile from shore. The villages of Akwiji and Blunkus are situated among large clumps of trees 3 and $4\frac{1}{2}$ miles, respectively, northeastward of Kitta.

The banks of the Kitta Lagoon are seen extending to the eastward, and the country on the northern side is described by the natives as being very productive. The inhabitants of the long intervening ridge between the lagoon and the ocean derive all their supplies of provisions from thence, which occasions a considerable canoe traffic between the opposite shores.

Elmina Chica, once a slave station, is 4 miles from Blukus; a high clump of trees helps to mark its position. From Elmina Chica the coast, with the same general appearance, bends gently eastward for 5 miles to Adaffia, a village situated on the beach, where there is a single white house nearly hidden among trees, which serves to distinguish it from Dano, the next coast village.

There are numerous factories between Kitta and Anecho (Little Popo).

Landing.—Neither at Elmina Chica nor at the intermediate places between it and Kitta will the signal for a canoe be attended to with any certainty.

Soundings.—Between Adaffia and Kitta a depth of 8 fathoms, over fine brown sand, is found $\frac{1}{2}$ mile offshore, and the 100-fathom curve is 13 miles distant, dropping abruptly from a depth of 43 fathoms, over black mud. Patches of gulf weed may be seen in this vicinity drifting to the eastward.

Dano, about $1\frac{1}{2}$ miles eastward of Adaffia, has four white houses, the most prominent being the German factory, and a Government house has been built behind some trees; there is also a small custom-house, and each of these establishments has a flagstaff.

Communication.—There is a telegraph station at Dano.

Aflao, also known as Porura, where there are three white houses and a store with a red roof, and both English and German trading stations, is about $3\frac{1}{2}$ miles eastward of Dano.

Boundary.—A flagstaff has been erected for the purpose of marking the boundary between the English and German Protectorates. Its approximate position is in latitude $6^{\circ} 06' 30''$ north and longitude $1^{\circ} 14' 00''$ east. Near the flagstaff are a few native huts, built close to the beach.

All the places near the shore which are under the German Protectorate hoist the German flag, and all the flagstaffs are painted in alternate bands of black and white.

Lome (Beh Beach), about 3 miles eastward of Aflao, is the largest place between Akkra and Lagos, having several English and German factories, as well as being the residence of the German commissioner. A large church with two lofty towers has been erected at Lome. The Catholic mission, situated at the eastern end of the town, is a large building with a small tower on the center of the roof.

Telegraph cable range beacons—Prohibited anchorage.—Two white beacons, marked T, have been established westward of the landing mole at Lome, which in line indicate the direction of the telegraph cable.

At night a fixed green light is exhibited from each beacon.

Anchorage is prohibited on or near the range marked by these beacons.

Radio station.—A radio station, call letters K B L, is established for public service at Lome. The normal wave length is 600 meters, but the sending apparatus may be adjusted to wave lengths of 300, 1,400, 1,800, and 2,500 meters.

The station is in operation from 7 to 10 a. m. and from 6 to 9 p. m., Greenwich time, and the rates are 30 pfennig (7 cents) per word.

Regulations.—The following harbor regulations are in force for the German Protectorate of Togoland:

1. The landing place for the whole German Protectorate is at Lome. Persons, animals, and goods can only be transported between vessels and the shore by using the Government pier. Exceptions to this require the governor's permission.

2. The district of the landing place of Lome comprises the pier and the roadstead, in as far as the latter is used by vessels for anchoring, so as to take advantage of the pier.

3. The police inspection of the port is in the hands of the customs authorities, and the official regulations made by the competent customs officials are to be complied with. The governor decides in the case of complaints regarding regulations of the customs officials; an appeal against the governor's decisions may be made to the imperial chancellor.

4. All vessels shall moor as near the head of the pier as possible; those lying too far away have no claim to be cleared.

5. Whoever infringes the provisions of paragraph 1 will be liable to a fine not exceeding 150 marks, or to imprisonment. Animals or goods landed contrary to the provisions and the vessels used may be confiscated.

Population.—In 1909 the population of Lome numbered 6,484, of whom 175 were Europeans.

Supplies.—Supplies of meat and good drinking water can be obtained, but no coal.

Light.—At the roof of the water tower close eastward of the pier at Lome there is exhibited a fixed red light, visible 11 miles.

Porto Seguro.—From Dano the beach is nearly straight for 26 miles in an east-northeasterly direction to Anecho (Little Popo), and midway between them is the trading port of Bagida. A range of bushy sand hills, with tall isolated trees 1 mile apart, extends 18 miles eastward of Dano. At 3 miles farther eastward, just within high-water mark, is situated the village of Porto Seguro or Gomaluta. On the eastern side of this village is a white house with a red roof, and on the western side a similar house with a flagstaff close to it. These are the only buildings which are conspicuous from seaward. Palms grow in numbers at the back of the village.

At Fishtown, $1\frac{1}{2}$ miles eastward of Porto Seguro, is situated a factory.

Lagoons.—Avon Waters, an extensive lagoon lying northward of Porto Seguro, is also locally known as Hako Lagoon; it is said to form a junction with Volta River at a considerable distance inland. The country around abounds in palm oil, cotton, indigo, and beeswax.

Between Porto Seguro and Godome a narrow lagoon extends for about 50 miles, being separated from the coast by a narrow sandy ridge. Several streams fall into this lagoon on the northern side, and it has an outlet eastward of Great Popo.

The depth in this lagoon during the dry season is only about 2 feet, but in the rainy season it increases to several fathoms.

Supplies.—On this part of the coast Jella Koffi is considered the best place for poultry, Adaffia and Porto Seguro for sheep, and Anecho for fish, vegetables, and fruit.

Anchorage may be obtained, in 10 fathoms, 1 mile southward of the eastern extremity of the bush at Porto Seguro.

Anecho (Little Popo).—About 2 miles eastward of Porto Seguro there is a clump of trees and a native village, and about 4 miles farther eastward Anecho presents an imposing front of beach storehouses and signal poles, one of which marks the residence of the native chief. A creek of the contiguous lagoon comes in an oblique direction from the northeast to within 120 yards of the sea beach, dividing the town (which is $\frac{1}{4}$ mile inland) from the whitewashed storehouses and dwellings that range along the high-water mark for the space of 1 mile, so that to proceed to the town from the lagoon either the head of the bight must be rounded or the creek, which is 14 feet deep and 300 yards wide, must be crossed.

Anecho is one of the largest places along this part of the coast, and is rendered conspicuous by its large white 2-storied factories on the eastern side. It may be readily distinguished from Port Seguro and Agweh by its situation on a strip of beach almost entirely free from trees except at its western part, where there is a remarkably thick palm wood, in which is situated the native town; it may also be known by the extensive clumps of trees inland near it.

Hospitals.—There is a European and a native hospital at Anecho.

Communication.—The British & African Co.'s steamers call here monthly, and there is a telegraph station.

Landing is bad in the rainy season, there being two separate lines of surf to pass through.

Anchorage.—A convenient berth for anchoring may be taken with the eastern extreme of the stores on the beach bearing 0° in 8 fathoms, over fine sand, about 1 mile off the heavy surf.

Caution.—A night should not be passed closer in than 1 mile from the shore, and even at that distance, on any part of this coast, a second anchor should be ready in case of a roller snapping the chain when there is no land breeze.

Current.—In the vicinity of Anecho the gulf weed is swept in by the swell to within 1 mile of the shore, and lies obliquely to the set of the current, which is to the eastward except in the harmattan season.

Soundings.—The 100-fathom curve lies 13 miles off Anecho in a southerly direction, the depth increasing suddenly to more than 200 fathoms.

Boundary.—Bayol Island, situated in the lagoon, in approximately latitude $6^{\circ} 15'$ north, longitude $1^{\circ} 40'$ east, marks the boundary of the German colony of Togoland and the French colony of Dahomey.

Agweh, 4 miles eastward of Anecho, is a native village with a population of about 7,000. It has two conspicuous buildings, the western a white house with a large veranda, the eastern a Roman Catholic Church of a yellow color, with a square tower at its western end.

Anchorage.—The holding ground is good off Agweh.

Mokowe, situated about $8\frac{1}{2}$ miles eastward of Agweh, has one long native-built shed and a few huts, but no European establishment.

Great Popo.—The shore for 11 miles eastward of Agweh is bushy, with scattered palm trees as far as Great Popo, eastward of which the sand ridge is broken through by the occasional outfall of the lagoon.

Several dark dome-shaped trees, situated 2 or 3 miles eastward of Agweh, are the most conspicuous objects on this part of the coast, when seen from a distance of 7 or 8 miles in the offing.

There are several factories at Great Popo, but they are not conspicuous from the offing, the native town lying at the back of the sand ridge, and extending 1 mile along the shore to the westward of the white houses. An elevation of the ground, about 200 feet high and surmounted by a few trees, stands 6 miles to the eastward, and is commonly known as Mount Pulloi or Mount Palaver.

The outlet of the lagoon in 1893 was situated about 8 miles eastward of Great Popo, and the channel appeared to be impassable for boats.

Great Popo may be readily distinguished when near by a large house which stands in the center of the beach and has a red roof and white pillars supporting a veranda; there are also two stores with red roofs situated a short distance westward of the station.

Communication.—The steamers of the Elder, Dempster Co. call, outward and homeward.

Whyda.—The coast from Great Popo for 13 miles in an easterly direction resumes its former appearance as far as Whyda, the next principal trading station. This place may be known, when 3 miles to the westward of it, by two dark clumps of trees, named the Brothers, and when made from the southwestward two white factories are conspicuous.

The beach station of Whyda appears from seaward to consist of half a dozen storehouses, sheds, and huts, all of which, when on a northerly bearing, make out clear of the western fall of a high grove of trees in the background. In the center of the town on the beach there is a dark-colored house with a white roof and a flagstaff near it.

The lagoon town of Whyda lies 3 miles from the beach station, on the northern shore of the lagoon, which here approaches to within $\frac{1}{2}$ mile of the beach and is only $\frac{1}{4}$ mile wide and 4 feet deep. The lagoon town, built on slightly rising ground, is estimated to contain

a population of about 12,000. Residents are considered to be more liable to intermittent fever than at other places on the windward arm of the bight.

Communication.—Elder, Dempster Co.'s steamers call here monthly, outward and homeward.

Supplies of live stock, vegetables, fruit, and, if desired, small casks of water can be obtained here; the surf is heavier than to the westward.

Anchorage. convenient for communication with the shore may be obtained 1 mile off Whyda in 7 fathoms of water, over brown sand, with the highest storehouse bearing 343° .

Soundings.—The 100-fathom curve lies 12 miles from the shore, the soundings dropping into deep water from a depth of 48 fathoms, over black mud, with 13 fathoms midway between that depth and the coast. The discharge of the lagoons at Great Popo gives a greenish tint to the sea that sometimes extends to this place.

Godome or Jackin.—The coast extends eastward for 15 miles in a direct line from Whyda to Godome, where it slightly projects; 6 miles eastward of Whyda a solitary white house is conspicuous, and there is a solitary palm on the shore about 3 miles westward of Godome. No huts or canoes are visible from the offing. At Godome Beach are two white factories. The village extends about $\frac{1}{2}$ mile along the beach.

Shoal.—A shoal with $4\frac{1}{2}$ fathoms of water over it lies 1 mile off the coast 10 miles eastward of Whyda.

Kotonu or Appi.—With a gentle bend to the northward the same character of coast continues for 6 miles eastward of Godome to Kotonu, a well-planned modern town and the chief port of the French colony of Dahomey. The locality may be recognized by its long iron pier and a large factory of one building with four roofs; a high iron chimney is situated on the west side, and a large white house with arched windows on the east side of the town, or by a vista through the flat jungle on the shore, which opens when on a northerly bearing; it may also be known by the house of the West African Telegraph Co., from which is flown a white flag with the word "Telegraph" thereon.

Kotonu is situated on the right bank of the cut or opening in the beach, which occasionally carries off the overflow of Denham waters. From 1887 to 1889, a period of $2\frac{1}{2}$ years, the lagoon communicated with the sea, but afterwards the opening was entirely closed. In September, 1900, it was again forced open by the waters of the lagoon, the opening being 200 yards wide, but it was again closed in 1903. At Kotonu there were, in 1888, three conspicuous factories. There are generally several vessels loading with palm oil here.

Pier.—From the shore a well-constructed iron pier, with landing stairs on the eastern side, extends about 312 yards seaward; it has a large pierhead, on which are five cranes. Mooring buoys are placed off the pier.

Light.—The red fixed light is exhibited from a white masonry tower, 39 feet in height, erected at the inner end of the pier; this light is elevated 52 feet and visible from a distance of 8 miles.

Telegraph cables.—A red buoy is moored 300 yards 143° from the extremity of Kotonu Pier to mark the line of telegraph cables.

Mariners are cautioned not to moor within 50 yards of the line joining this buoy and the root of the pier.

Communication.—The only communication between Kotonu and Porto Novo is by a shallow lagoon. The Dahomey Railway, whose terminus is at Kotonu, is open for traffic as far as Paouignan, on the main line, a distance of 120 miles, with a branch line to Whyda. A line from Kotonu to Tchaourou, intended eventually to reach the Niger, is under construction, and will have a total length, including a branch to Whyda, of about 435 miles.

The British & African Steamship Co. and the French lines Chargeurs Reunis and the Compagnie Fraissinet call at the Dahomey ports; also the German Woermann Line.

There is a telegraph station at Kotonu and three submarine cables are landed here.

Cable buoy.—A red buoy is moored 290 yards 145° from the extremity of the pier, to indicate the position of the telegraph cables. Vessels should anchor at least 55 yards from the alignment of this buoy with the shore end of the pier.

Supplies.—No supplies except cattle, fowls, and cassava are to be obtained.

Anchorage.—Men-of-war anchor southwestward and merchant vessels about 400 yards southward of the pier.

Soundings.—The 100-fathom curve recedes here to 17 miles from the beach, the depth increasing suddenly from a depth of 66 fathoms, over black mud, to more than 200 fathoms.

Porto Novo, with a population of about 40,000, is situated on the northern side of Porto Novo Lagoon, which is the name given to the western portion of Victoria Lagoon; it is about 14 miles north-eastward of Kotonu, about 6 miles from the coast and 48 miles westward of Lagos.

Porto Novo is the residence of the administrator of the French colony of Dahomey, and is a commercial center of some importance.

The trading station can be recognized on the western side by two houses with red roofs, having a white house with a flagstaff between them. On the eastern side there is a single white house.

Vessels of 8 feet draft are always able to proceed to Lagos through the lagoon.

Anchorage.—There is good anchorage in 8 fathoms, over sand and mud, at 2 miles southward of the station.

Soundings.—The 100-fathom curve is 16 miles from the coast, the soundings deepening abruptly from a depth of 44 fathoms, over black mud.

Boundary.—The eastern boundary of the French colony of Dahomey is about 5 miles eastward of Porto Novo.

Victoria Lagoon, for a distance of 9 miles westward from its junction with Lagos River has a general depth of from 12 to 18 feet; westward of this the channel is narrow and intricate for 7 miles, but after passing these narrows the bottom is clean in the center, with a uniform depth of 10 to 30 feet up to the town of Porto Novo. Westward of the narrows the water is perfectly fresh, but not wholesome. Fish abound, mullet are frequently caught weighing 3 or 4 pounds, and oysters and other shellfish are excellent and plentiful.

Westward of the entrance to Ajarra River the lagoon expands in width to about $1\frac{1}{4}$ miles, and is known as Porto Novo Lagoon. The shores of this lagoon are low and uniform in appearance, being composed of bog and floating grass closely matted together. The trees in the vicinity of the shores are generally small.

Wemi or Okpara River.—This stream, entered about $2\frac{1}{2}$ miles westward of Porto Novo, affords water communication between Lagos and Itowe, the landing place for Abomey. In December, 1876, it was found to have a depth of from 5 to 12 feet between Porto Novo Lagoon and the town of Kesamu, situated 18 miles northward of it. At Kesamu the river was about 125 yards wide and no current was perceptible.

In September, 1876, the colonial steamer *Eko*, drawing $4\frac{1}{2}$ feet, ascended Wemi River as far as Dugba, a distance of 55 miles from Porto Novo Lagoon and 23 miles southeastward of Abomey. The downward current at this season was found to be very strong.

It is estimated that the difference of level of Wemi River between wet and dry seasons is from 6 to 8 feet.

Toche Channel.—Immediately southward of the entrance to the Wemi River the lagoon contracts in width and forms Toche Channel, a narrow strait communicating with Denham Waters.

In December, 1876, there was a depth of only 3 feet in Toche Channel, and a tidal rise of 6 inches was observed. During December the water in the lagoon is generally lower than at any other season.

Denham Waters.—Westward of Toche Channel the lagoon expands considerably in breadth and increases in depth. This part

of these inland waters, known as Denham Waters, is about 10 miles long east and west and 5 miles broad.

Numerous towns, built on piles, are situated on this lagoon, which in September, 1876, had a general depth in it of from 8 to 10 feet. In the dry season there are several shoals with less than 3 feet of water on them.

The Zunu or So River enters the lagoon at its northern extremity; this river is navigable only by canoes.

At the southwestern part of Denham waters is a creek, which occasionally has communication with the sea.

Coast.—With the same description of foreground, but with continuous groves of high trees in the distance and occasional clumps in the intervening plain, the coast is nearly straight from the landing place of Porto Novo for about 6 miles in an easterly direction to the boundary between the British and French Protectorates, and thence for about 9 miles in the same direction to the landing place of Badagri.

From a vessel only two or three white huts of the town of Badagri can be seen on a northwesterly bearing; on all other bearings it is hidden by brushwood and palm trees. There is a pyramidal clump of bushy trees immediately to the eastward, known as mount Badagri; there are also two saddle-shaped clumps of trees and two groups of huts at 3 and 6 miles to the westward of Badagri landing place.

Badagri, with a population of 5,000, is on the northern side of Victoria Lagoon, 33 miles westward of Lagos, and 1 mile from the landing place, out of sight of either the anchorage or beach.

Westward of Badagri the Victoria Lagoon on its northern side receives the waters of Addo and Ajarra Rivers. These rivers are free and open to the inhabitants of the English and French Protectorates.

The English and French custom hulks are stationed at the entrance to Ajarra Lagoon, 5 miles eastward of Porto Novo, and all passing vessels must stop and be searched. No English money is allowed to pass into French territory.

A vessel drawing 8 feet of water may generally reach Badagri from Lagos through the lagoon, which is $\frac{1}{4}$ mile wide at Badagri and 16 feet deep. The intervening ridge of sand between it and the beach is about 1 mile across.

In 1890 the British naval vessel *Alecto*, having lightened to a draft of 8 feet on an even keel, proceeded up the Victoria Lagoon to the Ajarra River, a distance of about 10 miles northwestward of Badagri, the least water obtained in the lagoon being 10 feet. The anchorage off Badagri, in $3\frac{1}{4}$ fathoms, afforded ample swinging room, and at the anchorage off Ajarra River the lagoon was $\frac{1}{2}$ mile in breadth with deep water right across.

Anchorage.—Convenient anchorage may be obtained off Badagri landing place in 8 fathoms, over mud and shells, with the landing place bearing 355° distant about 1 mile. The signal for a canoe will be promptly answered here and every attention paid to applications for supplies.

Current.—Off Badagri, in the wet season, the current occasionally attains a velocity of $2\frac{1}{2}$ knots an hour, being influenced in direction by the wind. Between Badagri and Lagos the current has been observed to have a set toward the shore.

Coast.—The coast line eastward of Badagri presents the same appearance as that to the westward, and has similar soundings off it for a distance of 9 miles to Wuru, which may be recognized by a grove in the background, surmounted by two umbrella-shaped palm trees, also by a remarkable red house.

On the coast between Badagri and Wuru is situated one village, and some rows of salt pans will also be seen.

From Wuru the coast line trends eastward, gently curving both in and out for 24 miles to the opening of Lagos River.

The western half of the distance from Wuru to Lagos is very flat and bare, having but few trees and no huts upon it; but the eastern half shows a densely wooded background that rises from the margin of the lagoon.

Lagos River is the first permanent break in the coast line eastward of Cape St. Paul, and through it the periodic accumulation of the water in the lagoons finds a vent to the sea, occasioning a surf of no ordinary kind upon the bar. The river is situated at the southern part of the extensive lagoon known as Lagos Lagoon, and the principal channel passes westward of Eko or Lagos Island.

The entrance to the river is between Beecroft Point on the western and Greslie Point on the eastern side, the latter a low sandy continuation of the mainland, on the eastern part of which is Victoria settlement and the flagstaff and signal station. A number of vessels are usually at anchor outside the bar.

Light.—A fixed white light, visible 15 miles, is exhibited from a white circular lighthouse, 90 feet high, with a red lantern, about 100 yards westward of the sanitarium, on the western side of the entrance. For details, see Light List.

From the Beach signal staff, 400 yards seaward of the inner end of the East Mole, is exhibited a fixed red light, visible from a distance of 5 miles.

This light, which should not be relied upon, used in conjunction with the fixed white light exhibited from Lagos Lighthouse, will enable mariners entering the roadstead to ascertain readily when they are clear of the prohibited anchorage.

Sanitarium.—The Government sanitarium is on the western shore, about $\frac{1}{2}$ mile westward of Beecroft Point, where the coast begins to trend toward the entrance of the river.

Signals.—If, on arrival off the river, a vessel wishes to communicate with the shore, such intention should be made known by the International Code, viz, ensign over flags D O. The beach signal station being connected to the telephone exchange, messages can be at once transmitted to all parts of the town. The signal H W S calls the attention of the harbor master, and there is a Government steam lifeboat always available for bar service. Every vessel of war is visited as soon after arrival in the roads as possible.

Vessels wishing to cross the bar hoist flag R of the International Code at the fore, which, if repeated from the beach signal station, indicates that the vessel may proceed, but otherwise must wait. On leaving the port flag P over the answering pendant is used in a similar manner, the traffic being thus regulated from the signal station.

In thick or foggy weather outward-bound steamers give one blast with the whistle at intervals, and those inward bound two blasts.

Bar signals.—The following signals, hoisted at the beach signal station, indicate the condition of the bar:

At the commencement of the rise of tide: Flag N at half mast.

At high water and until the fall commences: Flag N at masthead.

Smooth bar: Flag S.

Bad bar: Flag B.

Bar impassable: Flag F R.

Pilots.—As no directions can be given for crossing the bar, pilotage is compulsory, and vessels should make the usual signal.

A steam lifeboat is used by the Government for communication with mail steamers and for survey purposes, and also for taking the harbor master out to pilot vessels in special instances.

The qualified pilots are mostly masters and mates of the local coasting steamers.

Anchorage.—Vessels can lie at single anchor off the town, in depths of from 12 to 22 feet, good holding ground, and except in the tornado season always swing with stern to the town.

The checkered buoys marking the edge of the bank in the center of the harbor have the depths in which they are moored painted on them.

Outer anchorage.—The limits of the outer anchorage are as follows:

On the east, a line drawn 166° from the beach signal mast.

On the west, a line drawn 180° from the lighthouse.

On the south, the 11-fathom line.

Prohibited anchorage.—In order to avoid injury to the telegraph cables, vessels must not anchor with the beach signal mast bearing westward of 346° , nor outside a depth of 11 fathoms.

Entrance channel.—The approach to the bar is in deep water, depths of 5 fathoms being found at a distance of 100 yards outside.

About half ebb a volume of surface scum, of a deep brown tint, pours out from the lagoon and spreads to a distance of 3 miles from the coast. During the rainy season (June–September) this discoloration of water is perceptible when at a distance of from 7 to 10 miles eastward of Lagos. During the dry season there is but little discoloration.

Bar.—The bar is subject to frequent changes of position and depth, but dredging operations are continually in progress, and in 1913 a maximum depth of 18 feet at low water, springs, was obtained.

Since dredging operations have been commenced the Bar Channel remains more constant in every way, both as regards depth and direction. The available depth on the bar is published in the Gazette and in public notices.

In 1912 the draft of vessels crossing the bar varied from $9\frac{1}{2}$ feet to $16\frac{1}{2}$ feet.

Breakers extend in a southeast by south direction from Beecroft Point for a distance of about 1,400 yards; they then curve in a north-westerly direction toward the beach between Beecroft Point and the lighthouse; the eastern portion of these breakers lies to the westward of the Bar Channel. The breakers on the eastern side of the Bar Channel extend also in a southeast by south direction and then curve to the eastward and northeastward without a break toward the beach at a distance of about $1\frac{1}{4}$ miles east by north of the inner end of the East Mole.

Buoyage—Southern Nigeria.—The following system of buoyage has been adopted by the Southern Nigeria Government:

Fairway buoys (except at Forcados, Bonny, and Calabar) are red conical buoys, surmounted by staff and diamond-shaped topmark.

Starboard hand buoys are red, conical, and surmounted by staff and globe.

Port hand buoys are black can buoys surmounted by staff and globe.

Bar buoys are marked “Bar” in conspicuous white letters.

In inland creeks and channels the buoys have no staves or topmarks.

A fairway buoy is moored off the Bar Channel in from 5 to 6 fathoms, but as all the buoys are liable to be moved from time to time to suit changes in the channels no positions for them can be given, nor can dependence be placed upon them.

The edge of the shoal water on the western side of the main channel between the Government house and the customs wharf is marked by telegraph buoys with staff and cage. These buoys are moored in 14 feet of water and have the depth marked on them.

The 20-foot contour on the western side of the main channel off Bruce Point is marked by four drum buoys, painted black and white in vertical stripes.

Two drum buoys, painted black and white in vertical stripes, have been temporarily moored in 21 feet of water about 200 feet from the 14-foot contour on the western side of the channel and 600 feet apart, the northern one being just southward of a line drawn 17° to the tower on the customs wharf. These buoys will be replaced by heavy mooring buoys.

Commodore Channel.—Within the bar Commodore Channel, which forms the only channel to Lagos, leads close to Beecroft Point and then crosses to the beach signal station, passing between the East Mole and the southern part of Bruce Shoal; it has been dredged to a depth of 16 feet.

From beach signal station Commodore Channel follows the eastern shore, having depths of from 18 to 26 feet at low water, springs, as far as the northwestern point of Lagos Island; it then narrows and becomes shoaler, but continues as Elegbata Channel, with a depth of 14 feet, in a northerly direction for about 300 yards, when it expands and deepens, forming a large basin, where vessels can either anchor or proceed to the railway wharf at Iddo or down the western side of the lagoon to Apapa dockyard, the channel to which has been dredged to a depth of 14 feet.

Wrecks.—Wrecks are numerous on the bar, but they usually disappear in three or four years.

Lagos town, the seat of the government of southern Nigeria, occupies the western portion of an island of the same name, which is connected with the mainland on the south by a bridge across a narrow tidal stream known as Five Cowrie Creek, and on the northwest by Carter Bridge to Iddo Island, and thence by Denton Bridge. The town is at the highest part 19 feet above the level of the lagoon, but the adjacent areas of swampy ground are being rapidly reclaimed.

A sea wall protects the southwestern side of Lagos Island, alongside which large native vessels receive and discharge cargo. Government house and the official residences are situated at the eastern part of the town, westward of which are the telegraph office, hospital, Christ Church, and other prominent buildings; the native town occupies the northern part of the island.

Wharves.—The customs wharf at the western end of the town is an iron structure, 780 feet long, with a depth alongside of 18 feet.

The railway wharf, situated at Iddo, is 650 feet long, with berthing accommodation on both sides; the depth on the north side is 9½ feet and on the south side 19 feet.

All inward cargo must be discharged at either the customhouse or railway wharf, but outward cargo is received at the numerous smaller wharves, at which the depths vary from 6 to 13 feet.

Breakwaters, under construction, extend in a southerly direction from Beecroft Point and Greslie Point.

The East Mole is 6,500 feet long, and is being extended to 8,500 feet; the West Mole is 908 feet long and being extended to 6,000 feet.

A beacon is erected on the East Mole at 600 yards southward of the signal station.

Population.—In 1911 the population numbered 80,766.

Communication.—See Chapter I.

Railway.—See Chapter I.

Coal.—About 15,000 tons are imported annually, and there is a Government stock of about 700 tons at Apapa dockyard, where vessels coal alongside the wharf, which has a depth of 15 feet.

Lighters can only supply coal outside the bar in very fine weather.

Supplies.—Supplies of all kinds are abundant.

Water.—The present supply of water is obtained from wells and rainwater tanks, but the quality is not good, nor in dry seasons is the supply plentiful.

A supply is being brought into the town through pipes from Iju River.

Good fresh water can be obtained in any quantity at the Government dockyard at Ipapa, where it is brought to a hydrant on the coaling wharf.

Repairs.—A Government dockyard is established at Apapa, well equipped with machinery, and where ordinary repairs can be satisfactorily executed.

Repairs can also be effected at the railway workshops at Ebute Metta.

Submarine telegraph cables.—Three submarine cables are landed on the beach eastward of the east entrance point of the river.

Quarantine.—All vessels on arrival hoist flag Q of the International Code at the fore until visited by the health officer.

The quarantine anchorage is outside the fairway buoy in a depth of not more than 11 fathoms, near, but not eastward of, a line drawn 166° from the beach signal station on the East Mole.

Signals.—A signal station is established at the beach signal staff, from which signals are made by International Code.

Tugs.—Two powerful Government steam tugs are available; the larger of these is fitted with fire and salvage pumps.

Harbor regulations.—A copy of these regulations can be obtained from the harbor master's office.

Lagos Lagoon extends about 10 miles in a north-northeasterly direction from Lagos Island, where it terminates in Ikoradu Bay, which receives the waters of the Ogun or Abeokuta River.

The Ogun River has been examined for 32 miles in a direct line from its junction with Lagos Lagoon to the town of Aro. The breadth of the river varies from 30 to 100 yards, and the banks are generally low.

At Aro, in November, the depth in the channel was 2 feet, and at 8 miles above that town the river, even in the rainy season, becomes impassable. A rapid downward current was experienced in the river, which is navigable only by boats.

The town of Abeokuta is situated about 4 miles northward of Aro.

Tides.—On Lagos Bar the springs occasionally rise 4 feet.

Kradu Water.—About 9 miles northeastward of Lagos Island a narrow channel, obstructed by Palaver Islands, connects Lagos Lagoon with Kradu Water, which has a long narrow lagoon extending 27 miles eastward from Palaver Islands to the native town of Epeh, on its northern shore.

In February, 1864, the British naval vessel *Investigator*, drawing 5 feet of water, proceeded from Lagos to Epeh, finding a depth of only 5 feet in the narrow channel off Palaver Islands.

Soundings.—On a 217° bearing from Lagos Bar the 100-fathom curve of soundings lies 18 miles from the shore, the depth increasing suddenly from 70 fathoms, over black mud, to more than 200 fathoms, with a depth of 29 fathoms and an occasional overfall at $9\frac{1}{2}$ miles from the coast. The 10-fathom curve approaches within 2 miles of the shore.

Tides.—It is high water, full and change, at Lagos Bar at about 5 h. 00 m.; springs rise 3 feet; neaps rise 2 feet; neap range 1 foot. Springs rise 2 feet at the Government wharf.

Tidal streams.—On the bar the direction and strength of both tidal streams vary, but generally the ebb stream sets diagonally across.

The flood stream usually sets to the northeastward until within the eastern mole, when it runs fairly up the harbor.

In the Bar Channel between Greslie and Beecroft Points, and in the lower part of the harbor the ebb stream frequently attains a velocity of 4 knots, and the flood of 3 knots.

During the rainy season the ebb stream has been known to attain to 5 knots.

In the upper part of the harbor the maximum velocity of the flood stream is 2 knots, and that of the ebb stream 3 knots.

The ebb stream makes down the river beneath the surface about 3 hours before the surface stream turns; the flood stream is not perceptible until within an hour or $1\frac{1}{2}$ hours of high water.

Coast.—The coast immediately eastward of Lagos resumes its usual characteristics. Okun Beju, a native village near the quoin-shaped clump of trees, lies 7 miles eastward.

Jakna.—From Okun Beju village the shore, trending eastward, is nearly straight, and presents nothing to view but a ridge of dense jungle for 12 miles, at which distance from the village there is a fan-shaped group of palm trees and then several isolated trees, with one village, about 5 miles eastward of which is situated Jakna, a place showing about half a dozen huts in a grove of palms. Jakna is at the northernmost part of the bight of Benin, the windward arm of which begins there to recede to the southward and trends in an easterly direction for 6 miles, to Palma village.

Between Jakna and Palma there are several small villages.

Palma may be identified by five huts, with palm trees at equal distances apart, situated at the eastern gables of each of the four eastern huts, and by three remarkable palm trees at $\frac{1}{4}$ mile eastward of the village, the middle tree being about half the height of the other two, and the whole group standing out in strong relief.

Avons Deep.—The regularity in the bank of soundings at 30 miles eastward of Lagos is interrupted southward of Palma by a remarkable submarine feature known as Avons Deep, in which the depth of water suddenly increases at the outer part from 70 fathoms to more than 200 fathoms and at the inner part from 40 fathoms to more than 200 fathoms.

The northern part of Avons Deep is about 7 miles from the shore, bearing 194° from the village of Palma.

There is no overfall nor anything on the surface to indicate the existence of this singular conformation at the bottom; nor is there any opening in the adjacent coast, or any apparent change in its character.

The navigator, however, should be on his guard when in its neighborhood, for if approaching the shore at nightfall, or in hazy weather, depending on the lead, and intending to be close in at daylight, he might be fatally deceived by a cast with no bottom in this deep, imagining his vessel outside the bank instead of within 6 or 7 miles of the beach. In some cases, however, this deep, like the Bottomless Pit to the westward, may be of material service to the seaman at night by giving him a fresh departure.

Lekki Lagoon, a shallow sheet of water several miles in extent, is connected with the town of Epeh at the eastern end of Kradu Water by a channel 9 miles long; Omu Creek is closed. The town of Lekki is in the southern part of the lagoon, on the northern side of the narrow ridge which separates the lagoon from the sea, about $1\frac{1}{2}$ miles from Shoroko at the outer entrance of Lekki Vista. From Lekki the inland water communication extends through creeks far to the eastward.

Coast.—From Palma the general direction of the coast line is eastward for 36 miles to the termination of the sandy beach, the western 21 miles showing a dark undulating bushy foreground and a distant and paler colored background of trees, which afford a striking contrast. The next 9 miles of coast is very flat, though bushy, and with no groves in the background. The remaining 6 miles has the back as well as the foreground features.

Mobido, a village with four huts, is situated on the shore 3 miles eastward of Palma; and at Lekki, 10 miles eastward of Palma, is the western of three remarkable vistas, with a village named Shoroko, and a group of palm trees. These vistas or lagoon entrances lie 5 and 12 miles apart, and appear open only when abreast of them. They are each about $\frac{1}{4}$ mile wide at the beach, and they cross the island of Kuramo at right angles.

There is a native village 5 miles from Shoroko, then the entrance to Otolu vista 1 mile farther on. Ikegu village, where there is a flagstaff, lies 2 miles eastward of Otolu vista, and thence the sandy beach, on which are a few huts, extends 11 miles to Ajimo (Odi Vista), the eastern of the three.

A village with two conspicuous palm trees is situated 5 miles eastward of Ajimo, and $\frac{1}{4}$ mile farther eastward an abrupt and remarkable change from sand to mud occurs in the nature of the coast, the dry soil, palm trees, and brushwood being succeeded by swamps and mangroves. With the alteration in the character of the coast its direction also changes to the southward, and flats of 5 fathoms extend 5 miles offshore.

This termination of the sandy beach is a striking feature in the navigation of the Bight of Benin. Thus far a vessel approaching from the westward may fearlessly run along the coast at the distance of a mile, except at the projecting bar of Lagos River, but after passing Ajimo muddy shallows of 3 or 4 fathoms in depth will be found within $2\frac{1}{2}$ miles of the shore.

The coast for 6 miles southeastward of the village with the two palm trees is a mud flat; no background trees give effect to those that are scattered along the margin of the sea, and the surf which breaks about 2 miles offshore is no longer heard. Inside the rollers there is smooth water close to the shore. At the southern extreme of this mud flat, two little openings, or vistas, into the lagoon may be observed. The shore then assumes a somewhat firmer character, and is interspersed with clumps of trees and scattered huts so far as the group of village named Town; whence to Benin River the coast line is slightly concave, but its general trend is southeastward for 27 miles. At 12 miles northward of the entrance to Benin River are two trees named the Sister Trees and some scattered groups of huts.

DELTA OF THE NIGER.

At Lagos the delta of the Niger may be said to commence, for from Lagos, as well as from the mouths of the numerous rivers between Lagos and the Opobo, it is possible to ascend the Niger through the many tortuous creeks which connect the rivers, forming inland waterways which are navigable for boats throughout, and in most cases for light-draft steamers for distances varying from 15 to 40 miles inland.

It is thus practicable to choose that river entrance where the bar offers the most favorable conditions for crossing, as, once inside, the deepest route by the creeks can be chosen for visiting the other parts of the delta, and the dangerous shallow bars avoided.

At Abo and Ndoni, nearly opposite each other, and about 75 miles from the sea, the delta may be said to end and the river proper to begin.

In making any of these delta entrances it is generally by the soundings and discolored appearance of the sea that the proximity to land is first ascertained, and the low coast line is first indicated by isolated trees which appear as unconnected forest islets distorted by the mirage. On a nearer approach the fringe of coast forest becomes united in one line, broken only by the river entrance. Within the bar the river shores are fringed with mangroves, behind which may be seen masses of inland forest, growing where the land has acquired a sufficient firmness, above the limits of high water.

As the river is ascended the mangrove loses its exclusive possession of the shores, and is replaced first by forest trees and higher up by park-like land.

The rivers which form the delta of the Niger are as follows:

| Name of river. | Position of mouth. | | Depth on bar at high water springs. | Used or not used. |
|----------------------|--------------------|-------------------|-------------------------------------|-------------------|
| | Latitude (north). | Longitude (east). | | |
| | ° ' " | ° ' " | <i>Feet.</i> | |
| Benin..... | 5 46 | 5 3 | 15 | Not used. |
| Escravos..... | 5 34 | 5 12 | | Do. |
| Fora los..... | 5 23 | 5 19 | 21 | Used regularly. |
| Ramos..... | 5 9 | 5 22 | | Not used. |
| Do lo..... | 4 51 | 5 28 | | Do. |
| Pennington..... | 4 43 | 5 33 | | Do. |
| Middleton..... | 4 31 | 5 40 | | Do. |
| Sengana..... | 4 18 | 5 58 | | Do. |
| Nun..... | 4 17 | 6 4 | 17 | Used regularly. |
| Brass..... | 4 17 | 6 13 | 17 | Do. |
| St. Nicholas..... | 4 20 | 6 24 | 7 | Not used. |
| Sta. Barbara..... | 4 22 | 6 34 | 9 | Do. |
| San Bartholomeo..... | 4 21 | 6 42 | | Do. |
| Sombre'o..... | 4 23 | 6 54 | 15 | Do. |
| New Calabar..... | 4 22 | 7 2 | 18 | Do. |
| Bonny..... | 4 2 | 7 7 | 26 | Used regularly. |
| Antonio..... | 4 25 | 7 21 | 18 | Not used. |
| Opobo..... | 4 28 | 7 35 | 15 | Used regularly. |

The best known of these are the Forcados, the Nun, the Brass, the New Calabar, and the Bonny, and they all unite with the main stream of the Niger at or below Ndoni, in latitude $5^{\circ} 33'$ north, longitude $6^{\circ} 33'$ east, and most of these various rivers will be described first, and then the main stream of the Niger above Ndoni. The delta rivers, together with the Kwoibo and Old Calabar are collectively termed the Palm Oil Rivers.

Principal entrance.—At present the Forcados has the least dangerous bar and the greatest depth on it, and through this river the greater part of the trade now passes. Steamers of 19 feet draft pass regularly over Forcados Bar.

Although close to the seacoast, within tidal influence, the estuaries of these rivers are connected by a network of more or less navigable creeks.

During the rainy season the bars of some of the Palm Oil Rivers are occasionally impassable, also at full and change of moon the crossing is worse than at other times.

The best time to enter is, as a rule, at the last quarter of the flood.

Government.—The whole area of the Niger Delta is a British possession, and is included in Southern Nigeria.

The country about Ida as far as Ilo is included in northern Nigeria.

Natives.—The principal native tribes inhabiting the Niger Delta are:

The Yorubas, a large and important tribe of agriculturists and traders, occupying the country extending from the western boundary of Southern Nigeria to Mahin.

The Ijaws, a tribe of fishermen and canoe builders, scattered throughout the delta from Mahin to Akassa and Brass.

The Jekris, who form a tribe of traders and fishermen, inhabiting the shores of Benin River and extending to Forcados.

The Ibos, an agricultural tribe, settled between the Niger and Cross Rivers.

Many of the Yorubas and Mohammedans, but Christianity has—at least nominally—spread largely among all the tribes.

Trading stations.—The Niger Trading Co. maintains numerous stations on the Niger, of which the most important are Burutu, near the junction of the Forcados and Wari Rivers; Akassa, at the Nun Entrance; Asaba, the administrative headquarters, about 150 miles up the river, where are the supreme court, the central prison, a hospital, and a botanical garden, and Lukoja, at the confluence of the Binue.

Commerce.—The natives on the banks of these rivers are exclusively devoted to the palm-oil trade, to seek which they ascend the numerous creeks of the delta of the Niger for 40 or 50 miles in their

large canoes. Provisions, poultry, meat, and food are scarce, but the rivers abound in fish. Yams, kids, and dried fish constitute the food of the population, who, finding the trade in palm oil more lucrative than that in provisions, sell but little of the latter, and at high prices.

Vessels lie in the rivers at all seasons. They should be housed over with palm thatch and have their holds thoroughly cleaned, particularly about the bilges and well, and if possible there should be ventilation along the bottom under the cargo. Stoves should occasionally be lighted, and the whole vessel kept as dry as possible.

A trading vessel frequently takes 3 or 4 months to complete a cargo of palm oil. A quantity of salt should be procured at Cape Verde Islands, krumen obtained on the Kru coast, and water and provisions purchased at Fernando Po.

About 30 steamers navigate the Niger and its tributaries.

The chief exports from the oil rivers are palm oil, palm kernels, rubber, gum copal, timber, ivory, cocoa, ebony, and camwood; shea butter is also exported. The principal imports are cotton goods, coopers' stores, hardware, and cutlery.

Products.—Dum and date palms, the deleb, oil palm, and coconut flourish. The most widely cultivated plant in the Binue Basin is a cotton with a remarkably firm fiber, and so glossy that articles made from it resemble silk.

Four kinds of corn are grown in the district surrounding the Binue, the maize being universally cultivated.

There are two forms of palm oil in the Niger Territories, known respectively as hard and soft: the soft, which is a liquid oil, is produced above Abutshi and in the Amamzara River. In other parts the oil is of the consistency of butter, the difference being only in the manufacture. The palm-oil season lasts from March to September, when the oil becomes scarcer and is out of season, but it may be obtained all the year round.

The bulk of the ivory exported from the Niger Territories comes originally from the Adamawa Province, the country lying between the Binue and Kameruns.

Sanitary precautions.—The delta of the Niger is very unhealthy on account of the swamps, and Europeans are seldom able to remain long in this region, but northward of the confluence with the Binue there is a great improvement in the climate, which compares favorably with that of India. Europeans in Southern Nigeria suffer chiefly from malarial fever and from diseases of the digestive system.

The diseases chiefly to be feared in the northern part of this territory are dysentery and sun fever, both of which may be avoided with ordinary care.

The greatest danger to health occurs from catching cold, excesses in eating or drinking, and exposure to the direct rays of the sun.

The special instructions for the preservation of health, already given in Chapter I, should be strictly followed.

Benin River is joined to the delta of the Niger by Nanna and Chanomi Creeks, but its origin is entirely distinct from that of the Niger. Its sources are at the head of the two small rivers, named Jamieson and Ethiope, which uniting at Sapele, in latitude $5^{\circ} 55'$ north, longitude $5^{\circ} 45'$ east, flow westward to the sea under the name of Benin River. Both the Jamieson and Ethiope Rivers are streams of clear water, and are said to rise from springs, the exact situation of which has not yet been ascertained, but it is quite certain that the muddy waters of the Niger have nothing to do with their origin.

On the right or northern bank of the Benin River are several creeks or tributaries, viz, Davey or Ologi, Gwato, Addabrassa, and Lagos Creeks, while on the left or southern bank it is connected to the Escravos and Forcados Rivers by the Alagico (Liverpool), Nanna, and Deli Creeks.

Navigability.—Although the Benin is fronted by a bar over which the depths are only from 8 to 9 feet at low water, yet vessels of $16\frac{1}{2}$ feet, by entering the Forcados River and approaching the Benin through Chanomi and Nanna Creeks, can ascend to Sapele, 50 miles above its mouth. Above Sapele the Jamieson River is navigable for vessels drawing 13 feet to Sapoba, and Ethiope River by vessels drawing 15 feet for 25 miles, after which both rivers become so narrow and crooked that only steam launches can proceed farther; these have explored the Ethiope for 50 miles above Sapele.

Stations on the river.—The principal settlements or stations on Benin River are Koko; Youngtown, at the junction of Nanna Creek with Benin river; and Sapele, at the Junction of Jamieson and Ethiope Rivers. Higher up, on Jamieson River, is Sapoba, and on Ethiope River Eku and Obiaraku. The city of Benin is not on the river, but about 22 or 23 miles inland; it can be approached either from Gwato Creek or through the bush path leading nearly due north from Warrigi, a native village just below Sapele.

A motor road leads from Sapele to Benin city, a distance of 31 miles; Ologi Creek is crossed by an iron bridge.

Communication.—The steamers of the Elder, Dempster Line call at Benin River, proceeding up to Sapele. They generally go over Forcados Bar and through Nanna and Chanomi Creeks.

Trade.—There is a large trade from this river in palm oil and mahogany; seven large factories are situated at Sapele and five at Kokotown.

The chief depot for mahogany is at Kokotown, the logs being rafted down the Gwato, Addabrassa, and Ologi Creeks, and up the Benin River to that town, where the water being fresh the logs can await shipment without injury from worms.

From Benin to Forcados the trade may be said to be in the hands of the Jakrimen, who are the middlemen. The busy season is from April to July.

Supplies.—Fresh vegetables and a few supplies can be obtained at Sapele, but with difficulty.

Pilots.—Native pilots for Nanna and Chanomi Creeks can be obtained at Port Forcados; they are generally trustworthy.

Bar and entrance.—The entrance to the Benin is difficult to distinguish from seaward. The northwestern entrance point forms a well-defined elbow, while on the southeastern side there is only a gentle curve, difficult to recognize when bearing north-northeastward. On the northwestern side breakers extend for $2\frac{1}{2}$ miles in a southwesterly direction, over which there are always heavy rollers. On the southeastern side is a spit extending 3 miles from the shore, with two detached shoals of 6 feet still farther off. Between these two shoals and the northern breakers is the bar, composed of hard sand, over which there are depths of from 8 to 9 feet at low water, and which in the rainy season frequently breaks heavily right across, but in the dry season is comparatively smooth.

Vessels drawing 11 to 12 feet formerly crossed this bar at spring tides during the last quarter flood, having regard to the state of the sea, which should be well considered, as it sometimes unexpectedly breaks with overwhelming force. There is, however, no advantage to be gained by vessels coming from the southward in entering the Benin River over its bar; it is better to enter by the Forcados. Vessels from the northward, if of suitable draft and with the sea over the bar smooth, might do so and save time. However, it is seldom crossed and is not recommended, as the changes since the last survey are unknown; practically all vessels cross Forcados Bar.

Benin Road.—This anchorage, 3 miles outside the bar and $5\frac{1}{2}$ miles from the river's mouth, is the only one available for trading vessels which can not cross the bar. In this road much rolling and pitching must be expected, but it affords good holding ground. The most convenient position for anchoring will be found in $4\frac{1}{2}$ fathoms, black mud, with North Point bearing 39° , which is about the line of bearing for leading over the deepest part of the bar. The lower reach of the river will appear open.

The houses at Lower Benin have been dismantled and the factories moved up the river.

Dangers inside the bar.—Battery Point is situated $3\frac{1}{2}$ miles within the entrance on the southeastern bank. Two islands lie off the point, Horsfall Island, the northern, being about $\frac{1}{2}$ mile distant. These islands lie on a large sand bank which here fringes the southern bank of the river. At Battery Point it is fully $\frac{3}{4}$ mile broad and

gradually narrows toward the southeastern entrance point, from which its edge is distant about 600 yards.

Booby Town or Obobi is a village situated about $1\frac{1}{4}$ miles southward of Battery Point.

Tides.—It is high water, full and change, in the entrance of Benin River at 4 h. 30 m.; springs rise 7 feet, neaps $4\frac{1}{2}$ feet.

The tidal wave is stated to reach to Kanaka, in Ethiope River, and to Gbiye, on the Jamieson River.

Tidal streams.—The tidal stream in the river is said to run sometimes at a rate of 4 to 5 knots an hour.

On the bar the ebb stream sets to the westward and the flood about east-northeastward, but a set toward the northern breakers has been experienced on the flood.

In December the flood stream runs only 3 hours, at the rate of 3 knots an hour, and the ebb as much as $9\frac{1}{2}$ hours at a rate of as much as 5 knots an hour. The discolored water discharges itself over a range of 9 miles radius from the mouth of the river.

Current.—Off Benin River the general direction of the current is to the southeastward, but after the harmattan has been blowing it is often reversed and runs sometimes with considerable strength.

Directions.—Before attempting to cross the bar the state of the sea and tide should be carefully considered, and no attempt should be made before the last quarter of the flood stream, nor even then if there is much sea, as it is better to go to the Forcados than to take unnecessary risks.

The leading mark across the bar of Benin River is North Point, bearing 50° . This will lead over in $8\frac{1}{2}$ feet at low water springs.

Note.—Benin Bar is not recommended and vessels should, as a matter of caution, proceed to Forcados Bar.

Anchorage.—There is good anchorage with fair holding ground anywhere in the lower part of the river on the northern side.

It is never advisable for strangers to spend a night within the bar if it can be avoided, as the exhalations from the river are notoriously unhealthful and the mosquitoes exceedingly troublesome; but should it be necessary to do so, a good berth is in 14 feet of water, over mud, with North Point bearing 323° , distant 1,800 yards.

Benin River above the anchorage.—The Benin River above the anchorage off New Benin is navigable without difficulty for any vessel of 8 feet draft for about 50 miles, to Sapele, at the junction of Jamieson and Ethiope Rivers. About 4 miles above Horsfall Island, on the right bank, Lagos Creek opens out; $3\frac{1}{2}$ miles farther, on the same bank, is the entrance to Addabrassa Creek; and about 4 miles farther is the entrance to Gwato Creek, which is one of the approaches to Benin city. Eight miles above the mouth of Gwato Creek is the entrance to Davey or Ologi Creek.

On the left bank of the river, 3 miles above Horsfall Island, is the entrance to Deli Creek; 13 miles above Horsfall Island is the entrance to Nanna Creek, which is a deep-water channel to Forcados River, and 8 miles up Nanna Creek is the entrance to Alagico (Liverpool) Creek, a deep channel through to Benin River.

Lagos Creek, which appears to be navigable for launches, joins Addabrassa Creek about 30 miles from its entrance.

Addabrassa Creek, which communicates with Lagos by a circuitous waterway, has a depth of 14 feet on a bar where it joins Benin River, but inside the bar the water deepens to 3, 7, and 12 fathoms for about 25 miles, where it joins Lagos Creek. There are fishing stakes off the entrance to Addabrassa Creek.

Gwato Creek is navigable by vessels of 15 feet draft for about 15 miles, and by boats to Gwato, 9 miles farther, whence a road leads to Benin. Off the western entrance to Gwato Creek, which is covered with high bush, is a shoal of 3 feet extending 300 yards in a southeasterly direction, and from the eastern entrance point a shoal, on which there are numerous snags, extends 1,600 yards to the south-eastward.

On the right bank of the creek, about 7 miles up, is a light-green triangular patch, and $1\frac{1}{2}$ miles beyond is the entrance to Ovenama Creek, which communicates with Addabrassa Creek. These three creeks which are connected with each other, drain the Oluwa, Ofusa, and Owena Rivers.

Siluko, situated on Siluko Creek, 10 miles below the junction of the Ofusa and Owena Rivers, is an important timber center and trading station; it is situated 65 miles from Benin River, and launches and lighters ply regularly between it and Kokotown and Sapele.

The Government transport *Trojan*, of 180 tons displacement and 7 feet draft, has ascended these creeks for 55 miles to Gbekabo, using either the Addabrassa or Gwato entrance to Benin River.

The creeks higher up are much encumbered with sudd, which occasionally blocks the channel in July and October.

A channel, about 20 feet broad, is kept clear for mail launches, canoes, and timber rafts.

Barrosa Island is situated 5 miles above the entrance to Ovenama Creek. A shoal extends 400 yards from the southwest extremity of this island.

Gwato.—This small village is situated on rising ground, 25 feet high, at about 670 yards up a winding creek.

Gilli-Gilli is a village about $1\frac{1}{2}$ miles westward of Gwato and Kaswar, a town of moderate size, at 2 miles northward of it.

Ovia River.—Above Gilli-Gilli, Gwato Creek is known as Ovia River, and is navigable by canoes for about 130 miles to Ifon. In

the dry season the channel is shallow, but during the rainy season the river rises rapidly, and, owing to the swift current, navigation is in some places dangerous.

Directions for Gwato Creek.—The outer part of the western entrance point should be given a berth of about 400 yards, gradually decreasing that distance to about 200 yards in entering the creek; thence a mid-channel course may be taken for 5 miles, when the eastern bank should be closed until opposite the commencement of reeds on the western bank.

Here the channel lies more toward the western bank, at about one-third of the breadth of the river from it, and it is necessary to sheer over into this channel, continuing in it until past the triangular green patch already mentioned, when, being nearly abreast the termination of the reeds, the eastern bank should again be closed.

The point opposite Ovenama Creek should be rounded close to the bushes to avoid a bank extending from the northern point of that creek; after which a mid-channel course leads $\frac{1}{2}$ mile southwestward of Barrosa Island.

Davey or Ologi Creek.—This creek, situated about 8 miles eastward of Gwato Creek, extends 35 miles in an easterly direction, with several bends, to Ologbo, where it is 120 feet wide, and spanned by an iron bridge.

The road from Sapele to Benin city crosses the stream at this point, the former place being 11 miles and the latter 20 miles distant.

Above Ologbo the creek is known as Osiomo River, and is navigable by canoes for 120 miles to Uhi.

A canal, used by trading canoes from Osiomo River, connects one of the bends of Davey Creek with Benin River.

There is a large and increasing trade on Osiomo River, but navigation is dangerous in the rainy season, owing to the rapid current, sharp bends, and snags.

Nanatown.—This settlement is situated close above the entrance to the canal connecting Davey Creek with Benin River.

Kokotown is a large settlement situated 2 miles above Nanatown on the same side of the river; a customhouse and post office are established here, and five factories, where a busy trade is carried on in country produce and mahogany.

An iron customs wharf is being constructed, and there are several private wharves.

Anchorage.—Good anchorage is found off Kokotown, and the velocity of the current never exceeds 2 knots.

Sapele.—This settlement, situated on the left bank of the river, at the junction of Ethiope and Jameson Rivers with the Benin, is the headquarters of the district, and the residence of the district commissioner, medical officer, etc.

The bush in the vicinity is cleared, and, though hot, Sapele is healthful.

A customhouse, post office, and telegraph office are established here, and good motor roads extend 32 miles to Wari and 31 miles to Benin city.

Seven factories are working at Sapele, and considerable trade is carried on.

Wharves.—An iron customs wharf is being constructed, and there is a small Government coaling wharf and several private wharves.

Communication.—A Government mail service by steam launches is maintained with Forcados in connection with the ocean mail service, and with Lagos via Kokotown, Siloko, Gbekabo, etc.

Coal.—A small supply is kept in stock, and about 350 tons annually imported.

Anchorage.—The best anchorage is opposite the residency, above the submarine telegraph cable, which crosses the river close above Monroe Island and below the residency.

The positions of the landing places of the cable are marked by beacons with the word "Cable" painted on them.

Ubini or Benin city is an irregular straggling town formed by groups of houses, separated by patches of bush: it is about $1\frac{1}{2}$ miles long in an east and west direction and about a mile broad.

Creeks on left bank of Benin River.—Deli Creek, 3 miles eastward of Battery Point, communicates with Nanna Creek by Batari Creek. It is reported to be deep, but so narrow that only small vessels or launches can use it. It is, however, little known.

Coast.—From the southern entrance point of Benin River the coast trends a little westward of south for 2 miles to Salttown, then southeastward for 10 miles to the entrance of Escravos River. It is everywhere thickly wooded, but some remarkable clumps of fantastically shaped trees are conspicuous, some resembling the letter Y, while others have received the names of Ship Tree, Giraffe Tree, and Tower Tree. On the narrow sandy beach the swell breaks but slightly after rolling in across the 5-fathom flat which extends 5 or 6 miles offshore.

Escravos River.—The funnel-shaped opening of the Escravos River, which, unlike that of the Benin, has its southern entrance point the best defined, lies 13 miles southeastward of Benin Bar. Heavy breakers extend from this point for 3 miles to the northwestward, and at first sight appear to join these from the northern entrance point, but there is occasionally a space at one-fourth the distance across from the latter, where from 8 to 9 feet at low water may be found. This channel is, however, too precarious to be safely used.

Landmarks.—A conspicuous tree, somewhat resembling the “Gula” trees at Forcados, is situated on the southern entrance point of this river, and care should be taken not to mistake the entrances of these rivers for each other.

When approaching from the southeastward a low sandy point is seen extending $\frac{1}{2}$ mile beyond the high tree on the southern entrance point.

It should be remembered that Forcados River entrance opens out when bearing 93° , and that of the Escravos when bearing 59° .

Tides.—It is high water, full and change, in Escravos River at 4 h. 27 m.; springs rise 5 feet. Discolored water is seen 6 miles seaward of the entrance.

Nanna and Chanomi Creeks.—The northern entrance of Nanna Creek is about 20 miles up Benin River. These two creeks form a continuous navigable waterway between Benin and Forcados Rivers, a distance of 43 miles. They are named after the chiefs of the district through which they pass. There is a minimum depth of 15 feet in the two creeks, which are commonly used by the African mail steamers. Some of these vessels are 350 feet in length. The turns are sharp, and caution is necessary in entering or leaving Nanna Creek at Youngtown, as the tides set strongly across the entrance.

Buoys.—The entrance to Benin River from Nanna Creek is marked by four can buoys, two on the eastern side painted red and two on the western side black.

Coast.—From the southern entrance point of Escravos River the coast, formed by a narrow sandy beach backed by high forest, trends in a southwesterly direction for 2 miles to North Point, and then bends sharply to the southeastward for 7 miles to Hughes Point, which forms the northern entrance point of Forcados River.

Forcados River, the best and most accessible route to the Niger, and also to the Benin, has an entrance about 2 miles wide, which is sometimes mistaken for the entrance to Benin River, and in making the land from the westward it should be remembered that Forcados River entrance is fully open when bearing 93° , while the Benin River entrance opens out on a 31° bearing.

The shores of the lower course of Forcados River are sandy and almost free from marsh and mangrove, and both banks are of moderate height, densely wooded, and bordered by a sandy beach. Ten miles within the entrance it divides into two branches, the southern arm retaining the name of Forcados, while the northern arm is known as Wari River.

The entrance is obstructed by a bar, but as the channel across has from 15 to 17 feet at low water and is of considerable width, Forcados River may be considered the most accessible estuary of any on this part of the coast, and it has smooth water 4 fathoms deep

immediately within the bar. The distance from Goshawk Point, Forcados River, to the Escravos by Chanomi Creek is about 15 miles.

The branch of Forcados River which enters the main river near Goshawk Point joins the Odube Creek at Bacaba, and thence takes an easterly direction and joins the main river of the Niger at Epedeh in approximately latitude $5^{\circ} 21'$ north, longitude $6^{\circ} 22'$ east. The whole of this waterway, which is spoken of as the Forcados, had, during the month of December, 1894, deep water, except some flats about 4 miles from Goshawk Point, on which there was a depth of 10 feet at high water. The river is said to fall as much as 3 to 4 fathoms during the dry season, and the channels frequently change.

Ganagana, one of the principal stations of the Niger Co., is about 31 miles from Goshawk Point by way of Forcados River. For about 22 miles from the point the banks are covered with mangroves, thence the banks are cultivated and densely populated.

Communications.—A regular mail service from and to Liverpool, Bonny, and Calabar is maintained by Elder Dempster steamers.

Government steam launches meet the arriving steamers and convey mails and passengers to Wari, Benin River, and Sapele. The light-draft steamers of the northern Nigeria Government meet these mail launches and continue the service up the Niger as far as Lukoja or Baro.

The river steamers of the Niger Co. are in constant communication with Burutu, and there is occasional communication by launches through the creeks to Akassa.

From Sapele there is a weekly service through the creeks by launch with Lagos.

Branch line steamers convey cargo to Lagos.

Steamers of the Woermann Line and cargo boats of Elder Dempster Co. call frequently.

Hughes Point is a sandy point backed by high mangroves.

Beacons.—A triangular beacon, 30 feet high, has been established as a front range beacon on the north shore of Forcados River.

The rear beacon, triangular, surmounted by a ball 60 feet high is located 1,000 yards 77° from the front beacon.

These beacons in range indicate the best channel for crossing the bar, the front beacon being moved as the channel shifts.

Moore Point, situated 9 miles eastward of Hughes Point, is a steep bluff, showing well from seaward when bearing southward of 93° , but to the northward of that bearing it is difficult, except in clear weather, to distinguish this point from False Goshawk Point, which is also a steep bluff, situated $2\frac{3}{4}$ miles to the eastward.

Goshawk Point, situated 1 mile eastward of False Goshawk Point, is a wooded point, sloping gently to the river, and forming the

west entrance point of Chanomi Creek; it is marked by a small white beacon, 15 feet high.

South Point.—This steep wooded point, situated 7 miles south-eastward of Hughes Point, forms the southern entrance point of the river.

A tree near the village of Gula, at 1 mile eastward of South Point, forms a conspicuous mark when seen from seaward. A rectangular white beacon, 60 feet high, and visible from a distance of 10 miles, is erected on South Point, 480 yards 254° from the cement pillar.

Wreck buoy.—A pear-shaped buoy, painted green, with staff and cage, is moored in 17 feet of water to mark the wreck of the steamship *Ilorin*, and is located 150 feet $172^{\circ} 40'$ from the remaining mast of the wreck.

Kwarra Point, situated 7 miles eastward of South Point, is marked by two white triangular beacons indicating the direction of the submarine cable to Abara, and by two red triangular beacons, the line between which and the beacon on Goshawk Point marks the western limit of the port.

The beacons on Kwarra Point are difficult of recognition.

Forcados Bar.—The southern breakers extend about 6 miles westward of South Point. The northern breakers lie about 2 miles northward of the southern breakers and from 3 to 4 miles off the northern bank of the river. There is no channel between them and that bank, except for boats, and that only in smooth weather. The channel over the bar lies midway between but nearly 1 mile outside the breakers; it has a width of about $\frac{1}{2}$ mile. The breakers are usually plainly visible, except in the harmattan season.

The depths on the bar are from 15 to 17 feet at low water. Ships usually load to $19\frac{1}{2}$ feet, but never above 20 feet. During and after fresh westerly winds there is often a considerable scend on the bar, which must be allowed for.

Tides.—It is high water, full and change, in the entrance of Forcados River at 4 h. 22 m.; springs rise 5 feet. It is high water, full and change, at Burutu in Port Forcados at 6 h. 00 m. (approximate); springs rise $4\frac{1}{2}$ feet; neap rise $3\frac{1}{4}$ feet.

Tidal streams.—In each dry season the tidal streams in mid-river run for about 6 hours each way, turning at about 3 hours after high and low water on shore; during the wet season the flood stream runs for 3 hours with a velocity of 2 knots, and the ebb stream for 9 hours at the rate of 3 knots.

Near the shore the streams turn about an hour earlier than in mid-river, and are variable in direction.

In the wet season discolored water extends 13 miles seaward of the entrance during the ebb stream.

At Port Forcados the ebb stream during spring tides runs for 7 or 8 hours; at Burutu for 8 or 9 hours; and at Bacaba no flood stream is experienced.

At neap tides the flood stream is hardly noticeable at Burutu.

On the bar there is generally a set to the northward at all times with both flood and ebb streams.

Buoys.—The following buoys are established to mark this channel across the bar:

Fairway Buoy, a red bellbuoy with cage topmark, situated on the following bearings:

| | |
|-------------------------------|---------|
| Goshawk Point | 91° 40' |
| Conspicuous Tree, North Point | 9° 40' |
| <i>Ilorin</i> wreck | 64° 40' |

Bar Buoy, a red conical buoy with cage topmark, situated about 6½ miles 225° from the front beacon and on the range.

Turning Buoy, a red conical buoy with cage topmark, situated 270° 4 miles from the above beacon.

Norman Buoy, a black can buoy with cage topmark, situated 201° 1.9 miles from the same beacon.

Wrecks.—Two wrecks lie sunk in the entrance to the river, at 6 miles 264° and 4.2 miles 246°, respectively, from the front beacon.

The western of these wrecks is that of the steamer *Ilorin* and forms a good mark of recognition.

The wreck of a wooden bark, with masts and yards standing, lies on the beach at Hughes Point, but is not conspicuous.

Pilots.—There are no pilots for Forcados River.

Vessels proceeding from Forcados to Wari or Sapele can get native pilots at Port Forcados.

Directions.—Vessels approaching from the westward or north-westward make the land to the northward of the entrance and steer along the coast in a depth of from 6 to 7 fathoms, the first object recognized being the range beacons and the wreck of the *Ilorin*, and then the beacon and tree on South Point.

About 6 miles northward of the entrance there is a fairly well-defined point with a clump of high trees.

The best time for crossing the bar is about 2 hours before high water and due allowance should be made for the conditions of wind and sea and for the tidal streams; when the bar is breaking right across it is advisable to wait until the last quarter of the flood before crossing.

The depth on the bar in the channel generally used is 15 feet at low water springs.

Having arrived off the Fairway Buoy, bring the Range Beacons in line, bearing 77°, and cross the bar. When Moore Point, which, if

visible, appears as a steep bluff, just shuts in False Goshawk Point, leave the range and steer 90° to pass northward of the Turning Buoy. When abreast this buoy alter the course to 102° , which should be continued until Moore Point is nearly abeam, when a 93° course will lead up to Port Forcados.

The Front Range Beacon will be moved from time to time to indicate the deepest water over the bar.

Port Forcados—Port limits.—The boundaries of Port Forcados are marked as follows: A line drawn from the beacons on Kwarra Point toward that on Goshawk Point until intersected by line from the Niger Co.'s building at Burutu through the extremity of Boma Head, the point of intersection being marked by a red conical buoy, surmounted by staff and cage, known as the Port Limit Buoy.

From this buoy the boundary line is toward Boma Head until intersected by a line drawn 280° from the West Point of Muri Creek to the northern extremity of Boma Head.

Town.—Extensive clearing and reclamation works have been carried out at Forcados, and a sea wall constructed from the old district house around Kwarra Point to Muri Creek. Factories, workshops, coal and transport stores, and numerous bungalows have been erected and roads and canals constructed. The town is comparatively healthful.

Wharves.—The Government wharf is 190 feet long, with a depth alongside of 17 feet at low water; Elder Dempster Co.'s wharf is 280 feet long, with a depth of 15 feet, and a jetty, with pontoon for launches, is situated opposite the customhouse.

Coal.—About 1,200 tons are kept in stock, and the annual importation is 10,000 tons.

There is a floating dock at Port Forcados capable of lifting 2,700 tons with a length on the blocks of 217 feet. It is of the sectional pontoon type, and was designed to be increased to a length of 326 feet and lifting capacity of 4,200 tons.

Submarine cables.—A telegraph cable is laid across the river from Kwarra Point to Abara, about $2\frac{1}{4}$ miles westward of Goshawk Point; the direction is indicated by two beacons erected on Kwarra Point, and vessels are prohibited from anchoring with these beacons in line.

A telegraph cable is laid from a position $\frac{1}{2}$ mile southward of West Point across Muri Creek to Clough Point, and thence close along the shore to the landing place at Burutu; the direction is marked throughout by beacons. From Burutu a cable is laid to Wari via Forcados Flats and Odube Creek.

Forcados is in telegraphic communication with Lagos and all parts of Southern Nigeria, also with northern Nigeria.

Repairs.—Ordinary repairs to machinery or boilers can be effected at the Government dockyard or by the Nigerian Dock & Engineering Co., at whose workshop there is a 10-ton crane and facility for making castings of a ton in weight.

Water.—Good boiler water can be obtained from the river by proceeding above Burutu to Britten Island and filling up at low water. No good fresh water is obtainable.

Chanomi Creek.—The southern entrance to this creek, between Goshawk and Wari Points, is narrowed to about 1,200 yards by a shoal extending about 200 yards off Goshawk Point, and by Madeira Bank, of a semicircular form, which, commencing at Wari Point, extends $1\frac{1}{2}$ miles southwestward, where it is $\frac{3}{4}$ mile offshore, and then northward to a small bay where there is a post office, on the eastern side of the creek.

Anchorage.—The anchorage at Port Forcados is northward and eastward of Kwarra Point, in a depth of from 4 to $5\frac{1}{2}$ fathoms. Vessels must anchor within the port limits and avoid the lines of telegraph cables; the tidal streams at the anchorage are strong, but the holding ground good.

During the tornado seasons (March-April and September-October) vessels should not anchor close to the shore.

The harbor is generally crowded with shipping.

Buoys.—Three small red buoys mark the edge of the bank northeastward of the anchorage.

Quarantine.—The quarantine isolation station is situated on the western side of Chanomi Creek, about 2 miles above Goshawk Point.

There is accommodation for both Europeans and natives.

Hospital.—There is a native hospital at Forcados, and one for Europeans at Wari.

Buoys.—The channel to Burutu is marked by three black square buoys.

There is good anchorage, much frequented by merchant vessels, about $\frac{3}{4}$ mile southward of Goshawk Point. During the rainy season, when the swell extends in as far as Goshawk Point, vessels generally anchor closer in at the entrance of Chanomi Creek.

Caution.—Steamers passing through the narrow creeks where the turnings are sharp should, in addition to sounding the stream siren frequently as a warning, have a lookout at the masthead to give notice of any approaching vessel.

Directions—Chanomi and Nanna Creeks to Benin River and thence to Sapele.—Round Goshawk Point at a distance of 400 yards and haul into Chanomi Creek. At $2\frac{1}{2}$ miles above Dempster Creek (2 miles within the entrance and on the left or eastern bank) Chanomi Creek branches in three directions. Rawson Creek, on the

port hand, appears as a continuation of the main creek and is liable to deceive strangers. Craig Creek is on the starboard hand.

The center one of the three branches should be taken. It has a very narrow entrance and does not open out until the vessel is close to it, when it will be seen to trend to the northeastward and then turn sharply northwestward, gradually widening from 60 yards to 250 yards. Keep in the center of the creek, giving all points a wide berth, as the deep water will be found in the bends.

There is a very sharp turn at the southern extremity of the island which fronts Elder Creek, and when past this steer for the center of Harvey Creek, keeping in mid-channel when rounding Bedford Point to avoid a shoal extending off it also taking care to guard against the tidal streams which appear to meet hereabouts. When Chanomi Creek opens out again, follow the bends as before.

After rounding Powell Point Escravos River will open out, and Rugged Point must be rounded at a distance of 200 yards, guarding against eddies, then steer for Campbell Point, keeping about one-third over from the southern shore. When abreast the village of Agitito, which is easily recognized, steer across for Escardos Point, and when the depth increases to about 5 fathoms, at about $\frac{1}{2}$ mile from that point, alter course for Dempster Point, passing through the lines of fishing stakes which sometimes extend across the river.

Pass Dempster Point at a distance of from 400 to 600 yards and keep at that distance off the eastern shore until $\frac{3}{4}$ mile above Joetown, when the shoalest part of the river will be passed, and a vessel can cross to Harrison Point, which should be rounded close to.

Having passed Deli Creek, keep in mid-channel, but well in the bends when passing points.

At $2\frac{1}{2}$ miles after passing Magrath Creek Nanna Creek spits into two, the wider of which turns southeastward and is named Alagico (Liverpool) Creek, through which there is said to be a deep-water channel; the other, the Nanna, turns sharply round to 356° and thence 277° , and is about 100 yards wide and very winding for the remainder of its course. Keep in the center, the width being from 60 to 100 yards, with high mangroves on both banks for $3\frac{1}{2}$ miles when the creek again divides into two branches; that to the southeastward named Hely Creek, is 150 yards wide; the other turns sharply southwestward and then northwestward, and is only 60 yards wide. This place known as the Fork is where the tides meet. Steamers often have to anchor to enable them to turn; it is therefore advisable to have a stern anchor ready to let go.

The banks at the Fork have low mangroves on the western point and high on the eastern and northern bank. This will be a good guide when approaching the Fork.

Proceed in mid-channel up the western branch of the creek for a little more than 5 miles, until the village of Youngtown, on Benin River is sighted.

When nearly abreast Youngtown steer 313° for two light green patches at the back of Windham Island, on the north side of Benin River, keeping the southern end of Youngtown astern, which leads between the banks off the entrance to the creek.

When in mid river steer 347° and then 32° to the northern bank.

Buoys.—There are four can buoys marking the channel at the junction with the Benin River. They are small, painted red on the eastern side and black on the western, and not to be depended upon. They are difficult to distinguish as the currents often carries them under water, especially at springs. The tidal streams here set strongly on either bank, and great care is necessary. There are fishing stakes and boxes off Palmas Point; it is possible to mistake the latter for the buoys.

Benin River—Youngtown to Sapele.—The distance is about 35 miles and the least depth obtained 15 feet. The banks in the creek are of soft mud and said to shift.

If proceeding up to Sapele from abreast Youngtown, steer across for the northern bank, keeping about 200 yards off it until past Davey Creek; thence in mid river. A shoal extends from the northern bank toward the Lecky Islets. It is advisable to keep over toward them in passing to avoid it, gradually altering course as necessary, when passing the islets, for Cappstown. When the river opens out again, alter course to about 116° , keeping well over to the eastern bank until past Lalor Point, then alter course to 137° , keeping more over to the eastern bank.

When the southern point of Fagan Island is abeam, gradually alter course to the eastward for the southern bank, keeping close along it until the river is seen to branch into two creeks on either side of Yoruba Island (low and marshy). Steer up the center of the creek running to the northward of the island, passing close to the village of Ogu, then keep in mid-channel until off Wright Creek, when three islets will be seen ahead covered with reeds, two on the western and one on the eastern side of the river. Steer to pass between these islets, keeping a little closer to the two on the western side.

When past the islets keep on the southern side of the river, to avoid a shoal, with 9 feet of water over it, which lies in mid-channel about halfway between the three islets and Warrigi, and when nearly abreast of Aruka village gradually alter course to 185° , passing between the southwestern bank of the river and Munro Island.

The channel northeastward of Munro Island is also navigable and is said to be preferable.

Off the southern point of this island there is a small, low, marshy islet; pass between this islet and Munro Island, when the Government buildings will be seen ahead, and mid-channel should be kept.

If proceeding to the factories in Ethiope River, keep near the northern shore until that river opens out, to avoid a shoal in the center of the river, just below the forts.

Wari River, which joins the Forcados a little above the entrance to Chanomi Creek, is navigable by vessels of about 17 feet draft to Wari. The least depth obtained between Goshawk Point and Wari is 15 feet.

Here the river is about 400 feet wide, but there are 3 fathoms at low water close to both banks and if riding to the ebb a hawser to a tree would easily swing the vessel for returning. The factories are built in clearings among the mangrove swamps, the upper factories and consulate being on the northern bank. The town of Wari, situated on the southern bank, close to the lower factories, is a swampy-looking place of some size and peopled by Zekis, who consider it a sacred spot. There are also numerous villages in the swamps surrounding the factories, most of them concealed from view. The chief trade is in palm oil obtained from the Sobo country.

Wari is the capital of the central province of Southern Nigeria, and the residence of the provincial commissioner; it is situated on the northern bank of the river, having a frontage nearly 2 miles long.

Seven European and three native factories are established and a considerable trade is carried on.

Extensive clearing of forest land has been carried out and numerous bungalows erected, also a new native town laid out.

There is a prison, courthouse, school, and good club.

Hospital.—A well-appointed hospital for both Europeans and natives is established, and there is a resident medical officer and two trained nurses.

Coal.—About 1,000 tons are kept in stock, and there are two coaling wharves; that of the Government is 40 feet long, with a depth alongside of 16 feet, and a private wharf, 80 feet long, with 13 feet alongside.

Communication.—The intermediate steamers of Elder Dempster Co. call once a fortnight, and cargo steamers frequently; the Government has daily communication through the creeks with Forcados.

Telegraphic communication by submarine cable is maintained with Burutu and Forcados, and by land lines with Lagos and other parts of the protectorate.

A motor road connects Wari with Sapele and Benin city.

Anchorage.—The best anchorage is abreast the German factory, above which vessels should not anchor, as a shoal extends from the

western extremity of the island, eastward of it; if making a long stay it is advisable to lay out a kedge anchor astern.

Water.—The river water may be used for boilers, but it should be taken toward the last of the ebb stream.

Supplies.—Fresh beef and bread can be obtained.

Wari River—Directions from Goshawk Point to Wari.—From the anchorage off Goshawk Point steer to pass about 400 yards off Wari Point, $2\frac{1}{4}$ miles distant, taking care not to shut in the points at the entrance of Forcados River. Having passed Wari Point, gradually edge across for Marescaux Point (7 miles from Wari Point), which should be given a berth of from 500 to 600 yards. Having rounded this point, keep close along the mangroves on the southern shore for about 6 miles until nearly abreast Porter Creek, where there is a hollow in the bank, when the course should be altered to 13° for $1\frac{1}{4}$ miles toward a small conical red buoy off Ivy Bank, which should be left about 50 yards to the eastward.

When abreast the buoy on Ivy Bank, or, if the buoy be adrift, when a small round mangrove island is abeam, alter course to north and steer for a conspicuous clump between two high trees on the western bank, and then keep at about 100 yards from this bank for about $1\frac{1}{2}$ miles, until abreast of a conspicuous high tree with white trunk, when steer for McDonald Point, which should be passed close-to; the channel in this locality is narrow and the streams strong.

From McDonald Point keep close to the bank for about $1\frac{1}{4}$ miles until the forest changes to mangroves, when cross to the north shore, avoiding Whydah Bank.

The northern bank should be followed until Benin Creek opens out, when again cross to the south side for $\frac{1}{2}$ mile, when recross and follow the northern shore until nearly abreast of Roth Creek. Pinnocks Factory should be passed at a moderate distance.

Whydah Bank.—A small black can buoy marks the western extremity of this bank.

Daisy Bank.—A black can buoy marks the edge of this bank.

When off Roth Creek ($2\frac{1}{4}$ miles above Hampson Creek) steer across for the southern bank, about 1 mile, to where some red cliffs will be seen ahead, keeping the mangroves on the western bank close-to until nearly abreast the eastern red cliff, when gradually alter course into mid-channel, passing about 100 yards off a small black buoy on the edge of Daisy Bank.

Having passed Crawford and Dundas Creeks ($1\frac{1}{2}$ miles above Daisy Bank Buoy), Pinnocks Factory on the southern bank will suddenly appear around the bend. Steer as close as possible to the factory, and after passing it gradually alter course for the northern

bank of the river to avoid a bank off the western point of Odube Creek. When above the creek, anchor either a little below Miller Bros. Factory or abreast of the creek leading to Wari town.

Vessels can secure alongside the bank opposite Miller Bros. Factory just below the residency.

Odube Creek, joining the upper part of the Wari River to the Forcados at Bacaba, is entered on the southern bank of the Wari between the upper and lower factories, and has a general south-westerly direction for nearly 9 miles to Forcados Flats, which is a large creek communicating with Forcados River. Odube Creek then turns to the southeastward for 6 miles and joins Forcados River.

Directions—Wari to Bacaba through Odube Creek.—From abreast the residency proceed up Odube Creek, keeping in mid-channel all the way. Eight miles above its entrance the Forcados Flats will be seen ahead. Give the point abreast of the flats a wide berth, as there is an extensive bank off it. The low grass of the point is covered in the rainy season. Six miles farther Odube Creek joins the Forcados River at the village of Bacaba. The least depth obtained at low water was 11 feet.

Directions.—If proceeding from Port Forcados to Ganagana, via Forcados River, keep from 200 to 400 yards off the western shore until abreast of West Point of Muri Creek, when steer for Clough Point, gradually altering course and passing the three black buoys marking the channel to Burutu, at a distance of about 100 yards on the port side.

After passing the eastern buoy keep close to the southern shore until Burutu is reached; a depth of 12 feet at low water will be found at this crossing, and between Port Forcados and Ganagana a least depth of 9 feet.

Burutu, situated $4\frac{1}{2}$ miles above Forcados, on the left bank of Forcados River, is the principal trading center of the Niger Co., who have large workshops for repairs to their river fleet and several hulks moored to the bank and used as warehouses or coal hulks.

Wharfage.—A length of about 1,000 feet of wharfage has been constructed, having a depth alongside of 15 feet at low water. The northern Nigeria Government have a wharf, 100 feet long, with a depth of 15 feet alongside.

Dock.—There is a floating dock at Burutu capable of lifting 400 tons.

Directions.—Above Burutu keep a little more than 200 yards off the southern bank of the river until past Britten Island, then gradually haul to the northward until past Goldie Creek, on the northern bank. 3 miles above the factory, when steer to pass 200 yards off Penfold Island. Rounding its northern point and keeping this distance off it until abreast of the southeastern point of the island, then

keep again in mid-channel. A little more than 1 mile above Croft Creek keep over to the southern bank of the river to avoid a small shoal, and about 2 miles farther on the village of Bacaba will appear, which can be passed close-to; and when Odube Creek opens well out, alter course to keep well in the middle of the river.

There is a bank off the point opposite Bacaba which should be given a wide berth. Keep close to the southern side of the river when approaching the village of Ayahromo, to avoid a bank off the point opposite the village, and after having passed Ayahromo keep in mid-channel until approaching the next point, when keep well into the bend, and having rounded it and the next point, the Niger Co.'s hulk, moored off a low grassy islet at Ganagana, will be seen. Keep across to the north bank when approaching the hulk, and when abreast cross over.

In December, 1894, British naval vessel *Barrosa*, drawing 15 feet, proceeded up the Forcados to Ganagana.

Route by the Forcados to the Niger.—Vessels wishing to proceed above Ganagana into the Niger can do so only from July to November, when the river is high; then their draft should not be more than 10 feet. The French naval vessel *Ardent*, drawing $7\frac{1}{2}$ feet, floated from a bank near Abo in the Niger and proceeded thence down Forcados River to sea before June 29, 1905.

Coast.—The coast southward of Forcados River has the same monotonous features as that to the northward; a dense forest and thick jungle rises from a narrow sandy beach, on which there is but little surf, except during the rainy seasons when it breaks heavily. In the whole space between Forcados and Dodo Rivers, a distance of 30 miles, there is no sign of habitation and no apparent background until on opening the Ramos River the receding plain and its thick forest are perceptible. No columns of smoke are to be seen by day nor fires by night to give animation to its gloomy and forbidding aspect.

The general set of the current is to the southeastward except during the harmattan months, from November to February, when it sets to the northwestward.

Within a depth of 9 or 10 fathoms the current is irregular with many eddies; outside those depths the velocity is about half a knot.

Soundings.—The bank of soundings to the 100-fathom curve extends 30 miles westward from the mouth of Forcados River, deepening suddenly from 90 fathoms, over black mud, to 180 fathoms, over sand. The 5-fathom curve, which lies 5 miles westward of Forcados River, approaches the shore a little to the southward of it to within 4 miles. Off Ramos River the 100-fathom curve is 29 miles from the shore.

Ramos River, which enters the sea 13 miles southward of the Forcados, is $\frac{1}{2}$ mile wide between its entrance points, which are well defined. A dome-shaped tree appears in the background between them when bearing 92° , which mark leads into the very limited channel over the bar. From the northern entrance point a sward and sandy spit, named Murder Spit, extends 1 mile seaward, and a village stands near the high water mark $\frac{3}{4}$ mile within the southern entrance point. Should it be necessary to enter this river from the sea, the bar will be found tranquil in the dry season; but as it is connected by creeks with the Forcados, it is more accessible through them.

Villages.—Numerous villages, inhabited by Ijaws, are situated on both banks of the river; these natives are accustomed to white people and are quite friendly.

Bar.—A belt of heavy breakers extends $2\frac{1}{2}$ miles from the shore in front of Ramos River, leaving occasionally in the middle a smooth space 670 yards in width. This part of the bar is 1 mile across, with 9 feet on it at low water, and therefore subject to a dangerous scend of the swell. Inside the entrance points the estuary has depths of 3, 5, and 7 fathoms and smooth water.

Anchorage.—The best anchorage, outside the bar, will be found with the entrance bearing about 86° in 5 fathoms of water, over black mud, at 3 miles off the bar and 5 miles from the river's mouth.

Tides.—It is high water, full and change, in Ramos River at 4 h. 20 m.; springs rise 5 feet. The ebb runs for 9 hours.

Dodo River.—From Ramos River the coast maintains the same appearance and the same general southerly trend for 18 miles, where another river issues through an oblique opening with an island in its mouth. This river, known as the Dodo, is only $\frac{3}{4}$ mile wide in its lower reach, though the opening in the shore at its mouth appears to be nearly 3 miles broad.

The native towns of Duni and Balabri, inhabited by Ijaws, are situated just inside the mouth of this river; these natives avoid white people, but are not actively hostile.

Walker Island, which occupies the southern portion of the river mouth, is covered with low scrub. All access for vessels to Dodo River, direct from the sea, is apparently prevented by the shoals which extend 3 miles northward and southward of this island and $1\frac{1}{2}$ miles seaward.

Boat entrance.—Should, however, a boat expedition into this uninviting place be necessary, an opening in the breakers may be sought in the dry season close over on the northern side, where there is a channel 670 yards wide and 8 feet deep, found by bringing the lower reach of the river open to the northward of Walker Island, on the bearing of 140° ; the last hour of the flood at spring tides

is the best time for entering, and a good lookout must be kept for bar rollers when approaching a low point which projects $\frac{1}{2}$ mile westward from the northern elbow of the entrance.

Anchorage.—Anchorage may be obtained in 4 fathoms of water, over black mud, with a distant arched tree in line with the northern extremity of the trees on Walker Island, bearing 97° .

The 5-fathom flat extends $2\frac{1}{4}$ miles westward of Walker Island, and $1\frac{1}{2}$ miles outside the bar breakers. The discolored waters of this river, like those of the Ramos, are seen when 7 miles in the offing.

Tides.—It is high water, full and change, in Dodo River, at 4 h. 17 m.; spring rise 5 feet.

Off the entrance to Dodo River the ebb stream runs for 9 hours. The outside current generally sets to the southward about a knot an hour.

Pennington River.—From Dodo River southward the coast is of the same featureless character, but bends about 22° more to the eastward.

The depth of 5 fathoms is found $3\frac{1}{4}$ miles offshore, as far as Pennington River, a small opening, seen on a 109° bearing. The entrance, 670 yards wide, within the entrance points, has only 6 feet upon the bar, which extends over an area of $1\frac{1}{2}$ miles. A narrow passage, between heavy and dangerous breakers, will be found by keeping the entrance upon the above bearing.

The native towns of Ekenie and Esajato are situated on this river; the natives resemble those of the Dodo River.

Middleton River.—From Pennington River the coast trends to the southward for 14 miles to Middleton River, which, when seen from the offing, appears to be a wide estuary with an island at the entrance.

Such frequent changes take place in the entrance channel that no description would be of service.

Factory Point, on the northern side, and South Point, on the southern side, are well defined points, but the apparent island is high trees on Hopkins Point, which divides Middleton River from the Benga Branch.

Miller Island, covered with grass and low scrub, is not visible until close inshore, and George Island is a sand bank. The natives are uncivilized and afraid of strangers.

Wreck.—The wreck of the steamer *Sultan of Sokoto*, with one mast standing, lies sunk on the northern side of George Island.

Bar.—From George Island a narrow curved spit extended $2\frac{1}{2}$ miles to the southward, between which and the bank extending from the southern side of Miller Island there was a channel about 670 yards wide, in which the least depth was $2\frac{1}{2}$ fathoms.

On the northern shore inside of the entrance, about $1\frac{1}{2}$ miles eastward of George Island, is an English factory.

Miller Island is separated from the mainland by a narrow 3-fathom channel, which connects the main and false entrances to Middleton River; a shoal spit connects the southern extremity of Miller Island with South Point, on the southern side of False Entrance.

Soundings.—A flat, with muddy bottom, extends 3 miles off the mainland, and the depth of 5 fathoms is found $1\frac{1}{2}$ miles outside the bar; the 100-fathom edge of the bank of soundings is 30 miles offshore, and the discolored water from the river is met when about 4 miles to seaward.

Tides.—It is high water, full and change, in Pennington and Middleton Rivers at 4 h. 15 m.; springs rise 5 feet. The ebb stream runs for 9 hours.

Kulama River, the entrance to which is $\frac{1}{2}$ mile broad, is situated $1\frac{1}{2}$ miles southeastward of Middleton River; as this river bends sharply to the southward, immediately within the entrance, the background of high trees makes it difficult of recognition from seaward.

The bar appears to be impassable by vessels, and within the bar the central channel is shallow, with deeper passages on either side.

Kulama.—The native village of Kulama is situated on the left bank at $3\frac{1}{2}$ miles within the entrance on a bend of the river, and is only 400 yards from the coast.

The natives are used to Europeans and friendly.

Fishtown (Funiwa) River.—This river, formerly known as Winstanley Outfalls, has an entrance $\frac{1}{2}$ mile wide, situated 8 miles southeastward of Kulama River; both entrance points are well defined. The breakers on the bar extend 1 mile from the shore.

Coast.—Between Kulama and Fishtown River the forest does not extend to the coast, but there is a belt of partially cultivated land with clumps of palm trees.

Sengana River.—From Fishtown River the coast trends southeastward for 9 miles to the entrance of this river, which is nearly 1 mile broad, but obstructed by a large sand bank in the center; the bar has been crossed by a vessel of 5 feet draft, but breakers extend $1\frac{1}{2}$ miles seaward from it.

Soundings.—The depth of 5 fathoms is found 4 miles seaward from the entrance to Sengana Branch, the discolored water from which extends that distance from the shore.

Nun River.—About 6 miles east-southeastward from Sengana Branch, and 95 miles from the entrance of Forcados River, is the Nun entrance to the Niger River, which was formerly considered the principal entrance and navigable waterway up the Niger, but, owing to extensive changes and shallows, only vessels of light draft

can ascend the river above the settlement of Akassa, even when the river is high.

The Nun River is imposing when first entered from the sea, but after reaching the settlement of Akassa, 3 miles within the entrance, the navigation is almost entirely obstructed by numerous flats, and it is not until the many offshoots on both sides are passed, 25 miles northward of the settlement, that the main stream regains a breadth commensurate with its importance. In many portions below its junction with the Forcados the Nun River is very shallow, with drying sand banks which are constantly changing, and it is here, in the dry season, that some of the chief difficulties of the navigation of this branch of the Niger are encountered.

Nun entrance lies between Cape Nun and Palm Point, the former bearing from the latter 309° , distant $1\frac{1}{2}$ miles. The shores on both sides are thickly wooded, with no distinguishing feature, and are so nearly upon the level of the river as to form a vast pestilential swamp.

In the Nun entrance the eastern point is bluff and well defined; the land on the western side forms a much more gradual slope.

Cape Nun, the western point of the entrance is somewhat low, the trees standing back some distance. A narrow sandy tongue of land covered with grass (where formerly an island existed) extends southward of Cape Nun, thus rendering the cape difficult to distinguish. Its southeastern extremity, Shelter Point, lies 670 yards southeastward from Cape Nun; here the neck of land after assuming an easterly direction turns sharply to the northward, where it nearly unites with Cape Nun and embraces a shallow lagoon mostly dry at low water.

The coast line about Cape Nun appears liable to frequent changes. Westward of the cape the land trends in a west-northwesterly direction to the Sengana Branch, with no landing by reason of the heavy surf. Northward of Cape Nun to Barracoon Point the trees reach close to the shore.

Light.—A flashing white light, elevated 99 feet and visible 15 miles is exhibited from Cape Nun. For details see Light List.

Palm Point, the eastern entrance point, is also low, sandy, and covered with grass; the forest trees stand back 670 yards to the northward of the point. The coast to the eastward maintains an easterly direction, without any features, and is similar to that to the westward. A square clump of trees, $2\frac{1}{2}$ miles eastward of Palm Point and about 670 yards inland, is somewhat remarkable amidst the unbroken line of tree tops.

At East Bluff, just northward of Palm Point, the tall trees reach close to the shore line, making the bluff conspicuous from seaward. There is a native village on the short $\frac{1}{2}$ mile northward of East Bluff.

Buoys.—A red conical buoy, with staff and diamond topmark, is moored as fairway buoy 5.7 miles 163° from South Mark Tree.

Spit Buoy, a red conical buoy surmounted by a staff and cage, is moored $2\frac{1}{2}$ miles 154° from the beacon. The buoys are unreliable in number, position, and distinguishing features.

Trotter Point, on the eastern side of the channel 3 miles northward of East Bluff, has some high trees not far from its extremity, but not very prominent. Northeastward of this point mangroves and swamps begin.

Curlew (Alburka) Island, composed of high mangroves, is situated in mid-river nearly 2 miles northward of Barracoon Point.

Curlew Flat.—An extensive drying mud flat, with patches of sand on its southwestern part, occupies a large area southward of Curlew Island. Hulk Spit, its southern extremity and steep-to, bears 357° 1,370 yards from Barracoon Point; here the river divides, the main Alburka Channel being eastward of this bank.

Akassa.—The Niger Co. have a factory on Barracoon Point, situated 2 miles northward of Cape Nun, but the former extensive establishment has been removed to Forcados and Bonny.

Wharf.—There is a depth of 10 feet at low water springs, alongside the wharf at Barracoon Point.

The native village, on the opposite side of the river and nearer the sea, consists of small quadrangular-shaped huts, constructed of palm fronds and thatched with palm leaves, crowded together in small clearings among the mangroves. The inhabitants, a slightly built and active people, employ themselves in fishing and agriculture, speak the Brass language, and have little intercourse with the English settlement.

Climate.—At Akassa fogs are common, their density being greatest in June and July and least in May and September. Dew is deposited from November to May, most copiously during February to April. Unusual visibility of distant objects occurs between the heavy rains. Harmattan dust is exceedingly dense during November and December, and in these months sand flies and fireflies are abundant during the nights.

Akassa formerly bore an evil reputation for sickness, but since the swamp surrounding the settlement has been drained sickness has diminished.

Communication.—The steamers of Messrs. Elder Dempster call but the times of arrival depend upon local requirements.

A mail service by steamer or motor launch is maintained through the creeks with Bonny via Brass and Degema.

Coal.—The Government stock is about 400 tons, and that of the Niger Co. 300 tons; about 1,100 tons are imported annually.

The lower coal wharf is 180 feet long, with a depth alongside of $13\frac{1}{2}$ feet. Vessels can not coal alongside colliers.

Supplies of all sorts are scarce.

Channel.—At Barracoon Point the channel is $\frac{3}{4}$ mile wide, and above that point it expands considerably for a distance of 3 miles, when it again becomes contracted.

Western Spit.—A shallow sand bank, oval in shape, nearly 1 mile long, and $\frac{1}{2}$ mile broad, extends southward from Cape Nun for $1\frac{1}{2}$ miles; between the northern extremity of the bank and Shelter Point is a boat channel named the Gut. Western Spit always breaks heavily and is fairly steep-to on its eastern side, with depths of 5 fathoms 400 yards distant.

Eastern Spit.—The heavy breaking rollers on the shoal ground southward of Palm Point extend nearly $\frac{1}{2}$ mile at low water in calm weather, and about half that distance at high water; this region should always be avoided as dangerous for all vessels. The western edge is fairly straight, and deepens gradually into the bed of the river. From its southern extremity it turns to the northeastward.

Bar—Depth.—The bar consists of a semicircular belt of sand with breakers, averaging 1,350 yards in width, connecting the Eastern and Western Spits, over which the general depths are from 7 to 9 feet on the western side and from 11 to 12 feet at low water on the eastern side, the outermost part of the bar being upward of 3 miles southward of Palm Point.

Block Shoal, small in extent with 9 feet least water and 11 feet all round, is the easternmost of the sand heads extending beyond Ocean Shoals and South Patches, and lies with Trotter Point and East Bluff in line bearing 359° , distant nearly $2\frac{1}{2}$ miles from Palm Point.

The bottom is of hard sand everywhere on the bar, and changes to mud immediately when off it. In the rainy season the bar frequently breaks all over, but in the dry season, when it is smooth, it only breaks after half ebb.

Ship crossing.—The Nun Bar is considered to be one of the worst bars of the Niger Delta, probably owing to its geographical position, the coast line here changing its direction sharply, rendering the bar fully exposed to the westward as well as to the southward; it is seldom that there is not a heavy swell on the bar, and the calm days are very few.

The ship crossing is eastward of Block Shoal.

Ships crossing sometimes load to 14 feet draft, but the state of the sea must be carefully considered and due allowance made for the scend. The vessel making the survey struck several times when descending in the trough of the sea, while proceeding with the south crossing marks in line 334° . The least depth recorded at the time

was 16 to 17 feet, but there was a confused sea and swell from the westward.

When the leading marks are not visible the lee breakers afford a sufficient guide for crossing, unless the sea be very smooth, when boats should be moored to mark the edges of the banks.

Tides.—It is high water, full and change, at Akassa at 4 h. 50 m. Springs rise 6 feet, neaps $3\frac{1}{2}$ feet; neaps range $1\frac{1}{2}$ feet.

Tidal streams.—At Akassa the flood stream begins $4\frac{1}{2}$ hours before high water and runs for $5\frac{1}{2}$ hours; maximum velocity at springs 3 miles.

The ebb stream begins $1\frac{1}{2}$ hours after high water and runs for $5\frac{1}{2}$ hours; maximum velocity at springs 4 miles.

In December the ebb stream runs for eight hours at a rate of 4 to 5 knots at springs and the flood for four hours at 3 to 4 knots.

High-water slack occurs one hour after high water and lasts for three-fourths of an hour.

Low-water slack occurs one hour after low water and lasts for three-fourths of an hour.

With a high river the effect of the tide is not felt beyond Sunday Island; with a low river it is appreciable as far as Agberi.

Buoys.—The buoys established in the entrance to the river are as follows:

A red conical fairway buoy, surmounted by a staff and diamond topmark, in a position from which the Bar Lighthouse (seen midway between the two Mark Trees) bears 331° , distant 5 miles.

A red conical buoy, surmounted by staff and cage, moored in a position from which the Bar Lighthouse bears 337° , distant $2\frac{1}{2}$ miles. This buoy is known as the Spit Buoy.

These buoys are liable to break adrift, and should not be depended upon.

Pilots.—No native pilots are available, but the masters of trading vessels which may be in the river occasionally act as pilots.

Outer anchorage.—A prudent distance to anchor outside the Nun entrance is 3 miles from the bar in 7 fathoms, on the leading mark for crossing. This anchorage is very disagreeable, owing to the heavy swell, to which vessels generally lie broadside on, in consequence of the easterly current. Anchorage has been obtained in $8\frac{1}{2}$ fathoms of water, off the river's mouth, with the entrance open, bearing about 357° ; here it was found that the vessels lay quietly, free from the rolling, the wash from the river keeping their heads toward it.

Inner anchorage.—The best berth inside the river is off Barracon Point in $8\frac{1}{2}$ fathoms, over mud, in mid-channel, the river entrance being kept well open to get the sea breeze. The tidal streams from the two river branches unite nearly in mid-channel on the ebb,

causing strong eddies; it is said to run at the rate of 5 miles an hour in the rainy season here, where the river contracts to $\frac{3}{4}$ mile in breadth.

Leading marks for the bar.—The lighthouse occupies the site of the former beacon. North Mark Tree, open eastward of the lighthouse, bearing 335° , leads about 800 yards westward of the fairway buoy and across the southern part of Ship Crossing. South Mark Tree open westward of the lighthouse, bearing 327° , leads about 800 yards eastward of the fairway buoy and across the northern part of Ship Crossing.

Sengana Point, one of the crossing marks, does not appear as the extremity of the land until bearing to the westward of 312° ; it then makes as a low buff, the rugged trees of which are generally distinguishable; it is fully 6 miles distant from the Ship Crossing; this point when kept between the bearings of 304° and 300° leads across the bar in the safest place in 11 to 12 feet at low water.

A careful survey has shown that the sea breaks less frequently in the northern part of the crossing, with Sengana Point bearing 301° .

In the harmattan season or during heavy rains the entrance is often obscured for days, and vessels are forced to remain outside.

Directions.—In clear weather there should be little difficulty in recognizing the entrance of the river; the zinc-roofed houses on Barracoon Point are plainly visible from the offing. If approaching from the westward do not shoal to less than 5 fathoms at low water, and steer up to the northward to the approach, as the houses on Barracoon Point become shut in by East Bluff bearing 343° . When approaching from the eastward, having passed the entrance of Brass River in a depth of 7 fathoms, steering about 262° , East Bluff, which will appear sharp, will soon be made out, but the land by Cape Nun will not be very distinguishable.

The best time for entering is during the last quarter of the flood, and the tides should be carefully studied. It should be borne in mind that in bad weather there is a heavy beam sea, and even in the best and driest seasons a heavy swell undulates if not actually breaks upon the Ship Crossing, which will be found calmer generally in the forenoon before the sea breeze sets in.

Having made out the marks, steer in to cross the bar with Sengana Point bearing 302° , which leads 400 yards southwestward of the fairway buoy; or with Cape Nun Lighthouse, seen midway between North and South Mark Trees, bearing 330° , passing just westward of the fairway buoy.

Note.—The bar is more quickly crossed when steering in with Sengana Point bearing 302° , but the point is not readily made out from that distance, and the compass error must be in no doubt. Entering with Cape Nun Lighthouse bearing 330° , seen midway

between the two mark trees, the crossing is somewhat longer, but the marks are much nearer, they are more readily distinguishable, and the swell is not so much abeam; the depths are the same in both cases, 11–12 feet at low water springs.

As Barracoon Point comes in line with the extremity of the land by Palm Point bearing 345° a vessel entering on either course will be on the outer part of the Ship Crossing.

Trotter Point on coming in line with East Bluff will show that the bar is crossed; if entering with the lighthouse ahead 330° care should be taken, especially if the flood stream be making, after Ship Crossing is passed, to avoid being set to the eastward, near Eastern Spit, and it will be better to alter course to the westward, bringing the conspicuous North Mark Tree in line with the lighthouse 334° . When in midchannel a 0° course will lead to the anchorage off Barracoon Point, passing midway between Eastern and Western Spits; here the channel is $\frac{1}{2}$ mile wide. Western spit always breaks, and its eastern side can be approached as near as 400 yards. On passing Shelter Point the channel widens somewhat and shallow water extends fully 600 yards from the western shore until past the entrance of Change Creeks.

The effect of the ebb tide will not be much felt till the river begins to open, when it immediately sets the vessel to the southward very strongly.

The ebb tide runs upward of 3 miles an hour in midchannel here during the dry season.

Leaving the river.—The directions are the reverse of those entering. Passing a safe distance from Eastern Spit the lighthouse-mark crossing will be found the easier to take, especially if the stream is strong. Steer to bring the lighthouse on Cape Nun in line, with North Mark Tree astern 334° , and as soon as the soundings shoal to 4 fathoms (if at high water) alter course quickly to the eastward, bringing the lighthouse to bear 330° midway between the two mark trees. Keep the lighthouse on this bearing until Barracoon Point is shut in by Palm Point and the soundings of 4 fathoms regained; the bar will then have been crossed.

The Gut, a narrow channel between Shelter Point and the northern extreme of Western Spit, has 7 or 8 feet depth at low water and is available for light launches; boats can frequently pass through here safely when it is breaking on the bar. The eye must be the best guide, taking care to avoid Race Spit.

Creeks.—The rivers between Forcados and Akassa are all connected with each other by deep mangrove creeks, so that communication by steam launches is maintained throughout the year, the distance being about 180 miles. Vessels 90 feet long, 20 feet beam, and of 5 feet draft have navigated this route.

Between Forcados and Middleton Rivers the creeks are wide and easily traversed, but between Middleton River and Akassa they are narrow and tortuous.

Akassa Creek, affording communication with Brass River, and available for vessels drawing $4\frac{1}{2}$ feet of water, is entered on the eastern side of the channel, 3 miles above Barracoon Point.

Soundings.—The discolored water from the Nun River extends 4 miles outside the bar, the line of junction being very marked. The 100-fathom curve lies 33 miles offshore; a depth of 23 fathoms, over fine dark sand, will be found when 16 miles southwestward of the bar.

Nun River above Akassa.—The only available channels for vessels proceeding above Barracoon Point are through Alburka Channel (which is entered immediately northward of Barracoon Point) and Louis Creek, situated on the western side of the river, $6\frac{1}{2}$ miles northward of Palm Point.

Between Louis Creek and Oguburi River (which joins the Nun on the western side 42 miles above Trotter Point) the channel, although narrow, and in some places obstructed by islands, does not appear so liable to change, nor so difficult to navigate, as that part above Oguburi River.

Alburka Channel has the deeper water, but its numerous sharp turnings prevent its being used when descending the river. A water-logged hulk lies near the southern extremity of the spit extending from Curlew Island.

Louis Creek.—In Louis Creek the least water found is 9 feet; it is recommended when proceeding down the river to pass through this narrow channel during the flood stream, as the ebb runs strongly.

Ekau.—From Akassa the general direction of the river is northward for about 25 miles to Ekau, a Niger Co.'s trading station; for 10 miles after passing Nicolls Islands, at the entrance of Louis Creek, the river is only about 150 to 200 yards wide and flows through densely matted forests of handsome mangroves; beyond this the mangroves give place to palm, bombax (cotton trees), and numerous other trees, growing to the water's edge; there are small clearings of bananas and sugar cane and occasional small groups of square mud huts on the bank.

The station of Ekau consists of a mud and wattle dwelling and a couple of iron sheds. The country around is flat, swampy, and intersected by innumerable small creeks; numerous villages are scattered about the district, the inhabitants, chiefly belonging to the Oru or Idzo Tribe, speaking the Brass language, and having a very poor physique.

Bassa Creek.—Three miles above Ekau the Nun River is joined to Sengana River by Bassa Creek.

Angiama is situated on the left bank of the Nun, about 12 miles above Ekau, and here the river increases in width, being fully a mile across in some places; above Angiama, at Otua, the Niger is joined by the Oguburi, which unites the Forcados to this part of the Niger, and, together with a creek opposite Sabagreia, forms Wilberforce Island.

Ekole and Sabagreia, the former on the right and the latter on the left bank of the river, are both stations belonging to the Niger Co.; they are very similar to Ekau, from which they are distant 28 and 35 miles, respectively. The entrance to Ekole Creek, between two sandy banks, is situated on the left bank opposite Ekole; this creek, which communicates with the Brass River, is available for steam launches drawing $4\frac{1}{2}$ feet of water.

Here the down current in August, 1877, was found running about 3 or 4 knots an hour.

Agberi.—About 26 miles above Sabagreia is the native town of Agberi, also on the left bank. Here the Oru country ends; the river widens considerably, and 5 miles farther on the Forcados River, a magnificent sheet of water about $\frac{1}{2}$ mile in width, is seen flowing away to the westward. The tide in the Nun River is perceptible until just below Agberi.

Abo is situated on the right bank, about 22 miles above Agberi; the town stands about $\frac{3}{4}$ mile behind the factory, and during floods the streets become canals and communication is carried on in canoes. This town, in the Ibo country, is of secondary importance and has little trade; the population is estimated at about 8,000. The natives are a healthy and well-developed people. At Abo and Ndoni, nearly opposite, the delta of the Niger may be said to end and the Niger River proper to begin.

The trading station of the Niger Co., the Government station, the district commissioner, and medical officer are located on the eastern side of the river.

Ndoni is about 2 miles above Abo on the opposite bank; the anchorage between Ndoni and Abo is in 5 fathoms of water.

At Ndoni the river of the same name, also known as Onita or Oguta Creek, flows southeastward, with a breadth of about 100 yards, for about 15 miles and then joins the Orashi River, which, rising in Oguta Lake, discharges as the Engenni River into the Sombrero and New Calabar Rivers.

Ase is a trading station of the Niger Co. on the southern side of Ndoni River, and at the junction of the Ndoni with the Orashi a guard hulk is moored off Gregiani Station; the native town of Omoko, the inhabitants of which are the wildest of any of the known Ibo clans, lies on a small lake of the same name a few miles east of Gregiani.

The Niger Co.'s launch *Vigilant*, drawing about 3 feet of water, proceeded down Ndoni River, and then north up the Orashi River to Lake Oguta, which is about 30 miles from the junction of the two rivers; here the company has a trading station on the southern side, the native town of Oguta being on the northern shore of the lake. Native troops are quartered here.

The Orashi River, issuing from Oguta Lake, discharges into Engenni River and the network of rivers between Brass and Bonny. In the rainy season steamers of considerable draft, belonging to the Niger Co., navigate between Oguta Lake and the Niger via Ndoni Creek, but in the dry season there is not sufficient depth for launches.

Oguta Lake is about 5 miles long in an east and west direction and $1\frac{1}{2}$ miles broad, with wooded shores; it is formed by the junction of three rivers, the Orashi, the N'Jaba, and the Obane, of which the Orashi drains the lake, and in the rainy season is connected with the Niger, at about 10 miles above the lake, by Munankor Creek.

Orashi River is navigable by launches in the wet season, but only by canoes in the dry season.

The water of Oguta Lake is considered to be unwholesome, and, if used for bathing purposes, is said to cause skin diseases.

Niger River originates in several small streams which rise in the Kong Mountains; these mountains run parallel to the Guinea coast (about 200 miles inland), near the borders of Sierra Leone. These small streams unite just above Bammako, the first place of importance on the Niger, whence the river runs in a general northeasterly direction for 450 miles to Timbuktu. The only tributary of any importance which joins it between those two places is the Mayel Balevel or Bani River, which unites with the Niger at Mopti.

From Timbuktu the Niger flows eastward for 152 miles to Buram Island, and thence southeastward to Gomba, a distance of over 400 miles. At Gomba it is joined by the Sokoto River, and thence flows in a general southeasterly and southerly direction to Abo and Ndoni in approximately latitude $5^{\circ} 52'$ north, whence it spreads out into the delta.

For descriptive purposes the Niger is usually referred to as the Upper, Middle, and Lower Niger. The Upper Niger comprises the river from its sources to Buram Island; the Middle Niger from Buram to Jebba, at the foot of the Busa Rapids; and the Lower Niger from Jebba to the sea.

Upper Niger.—The Upper Niger varies considerably in width. At Bammako its width is estimated at 430 yards and the depth at about 6 feet. Bammako, a place of considerable importance, is the administrative capital of the colony.

Farther down, the Niger, especially after its junction with the Mayel Balevel, shows a great tendency to split into different chan-

nels, often inclosing extensive tracts of country, and an exceptional inundation makes it into a large lake. This continues until below Timbuktu, when the river again becomes confined between banks, which at Tosei, just above Buram Island, narrows its breadth to 150 yards, and increases its depth in proportion. At Buram Island at the end of the Upper Niger, the river again widens to about 3 miles.

The upper Niger is navigable from Kurussa to Bammako, a distance of 225 miles; and from Kulikoro the river is navigable downstream a distance of about 1,000 miles. There are several steamers and launches on the river which ply between Kulikoro and Kabara (the port of Timbuktu). The average length of the journey is from three to six days, varying according to the depth of water and the number of stopping places.

The Senegal-Niger Railway, about 350 miles in length, connects Kayes on the Senegal River with Bammako and Kulikoro on the Niger.

Middle Niger, between Buram Island and Jebba, is much encumbered with rocks and rapids. Near Buram Island the hills close in and form a sort of defile, but at Say the river again widens to 700 yards, with rocky banks 20 to 30 feet high on one side. About 10 miles above Busa the river is said to be 8 miles in width, but at Busa it is contracted to a very narrow pass; farther down it again widens.

There are several important towns on the Middle Niger, such as Say; Gomba, at the junction of the Sokoto River with the Niger; Busa, a large place walled on the side farthest from the river, where are fine cattle, sheep, and goats, while in the surrounding country are found deer, antelopes, guinea fowl, pheasants, and partridges; and Bajibo, also a large place, but not well built, where there is a French station for the transit of merchandise.

The navigation of the Middle Niger is very difficult, even for canoes, on account of the many rocks and rapids, and is impracticable for steamers. The river is navigable to Jebba, 18 miles above Rabba, and river steamers have reached Bajibo, but from Jebba to Bajibo the navigation is very difficult.

On the Middle Niger there are Government stations at Busa, Liaba, and Bajibo. At Liaba a supply of wood is kept for river steamers.

The Lower Niger and Binue Rivers.—From Jebba to Ndoni and Abo, where the Delta may be said to begin, the Niger is navigable for steamers of very light draft (less than 2 feet) at all times. At Lukoja it is joined by the Binue, which is navigable to Yola, 400 miles above Lukoja. At their confluence the Niger is about $\frac{3}{4}$ mile wide, and the Binue rather over 1 mile; the united streams resemble a lake, about 2 miles in width, dotted with islands and sand banks.

Level of the Niger.—The Niger River, like many other rivers, has a high and a low level, but it has a peculiarity which is almost

entirely confined to itself. Owing to its opening out at places into many streams, and then again converging into one stream, the rise in the Upper Niger takes a whole year to travel to the Lower Niger.

On the Lower Niger the river above its junction with the Kuduna (Lafun), 40 miles above Egga, reaches its lowest at the end of June, and the first rise takes place about the middle of July. The river reaches its highest level in the end of September. The Binue begins to rise early in June. During April, May, and June the navigation is difficult for steamers of even 2 feet draft.

Navigability.—From the following table it will be seen that in the Lower Niger, between Lukoja and the sea, the water is lowest in May; between Lukoja and Rabba in June and July. The river below Lukoja begins to rise about the middle of June, and by July 7 is usually sufficient high to enable the ordinary river steamers to run. Above Lukoja the rise begins near the end of July. The rise increases till the end of September, when the level remains more or less stationary until the middle of October, and then it falls moderately.

The great fall is about the last week in October, but a slight rise above this often occurs in January, then a slow fall until May or June.

The tidal influence appears to extend about 25 miles within the entrance of the Nun.

| Places. | Distance in miles from Nun River entrance. | Period at which the river reaches its lowest level. | The greatest draft that can reach the place at that time. | Period at which the first considerable rise takes place. | The greatest draft that can reach the place at that time. |
|---|--|---|---|---|---|
| Lower Niger: | | | | | |
| Abo..... | 95 | Middle of May. | 5 feet..... | At the end of May a temporary rise, and in the middle of June a permanent rise. | 6 feet. |
| Asaba..... | 139 | May..... |do..... | June 30..... | Do. |
| Ida..... | 195 |do..... | 4½ feet..... | | Do. |
| Lukoja, at the confluence of the Binue. | 237 |do..... |do..... | June..... | Do. |
| Egga..... | 315 | June and July. | 3 feet..... | End of July..... | Do. |
| Rabba..... | 417 |do..... |do..... |do..... | 5 feet. |
| Middle Niger: | | | | | |
| Jebba or Geba... | 433 |do..... |do..... |do..... | Only to be reached from Sept. 15 to 30 in vessels drawing not more than 3 feet. Navigation dangerous on account of rocks above Jebba. |
| Bajibo..... | 459 |do..... | Can not be reached. |do..... | |
| Llaba (50 miles below Busa). | 481 |do..... |do..... |do..... | Only to be reached Sept. 15 to 30 in vessels drawing not more than 3 feet. |
| Busa..... | 525 |do..... |do..... |do..... | |
| Binue River: | | | | | |
| Ibl..... | 342 | Mar. 31..... | 1½ feet..... | June 1..... | 4 feet. |
| Yola..... | 520 | March..... | 1 foot..... | July 1..... | |

| Places. | Period at which the river attains its maximum height. Average maximum rise. | The greatest draft that can reach the place at that time. | Period at which the river begins to fall. | Period at which the great fall commences. | The latest time vessels of maximum draft can remain. |
|--|---|---|---|---|--|
| Lower Niger: | | | | | |
| Abo..... | End of September, 30 feet. | 12 feet..... | About the first week in October. | Last week in October. | Last week in October. |
| Asaba..... | do..... | do..... | Oct. 15..... | Oct. 25..... | Nov. 10. |
| Ida..... | do..... | do..... | Oct. 10..... | do..... | Nov. 1. |
| Luhua, at the confluence of the Binue. | First week in October, 35 feet. | do..... | Oct. 10 to 15... | Oct. 10 to 15... | Oct. 25. |
| Egga..... | End of September, 18 feet. | do..... | About Oct. 10. | About Oct. 10. | Oct. 10. |
| Rabba..... | End of September, 12 feet. | 8 feet..... | Oct. 10..... | Oct. 10..... | Do. |
| Middle Niger: | | | | | |
| Jebba or Geba..... | do..... | 5 feet. Safe navigation ends at Jebba. | do..... | do..... | Do. |
| Balibo..... | do..... | 3 feet..... | Oct. 5..... | Oct. 5..... | Oct. 5. |
| Liaha (50 miles below Busa.) | do..... | do..... | About Oct. 5. | do..... | Do. |
| Busa..... | (¹)..... | (¹)..... | | | |
| Binue River: | | | | | |
| Ibi..... | Sept. 30, 30 feet.... | 12 feet..... | Oct. 1..... | Middle of October. | Oct. 10. |
| Yola..... | Middle of September, 18 feet. | 10 feet..... | End of September. | do..... | End of September. |

¹ River not navigable to Busa on account of rapids.

Supplies.—Sheep, goats, fowls, eggs, yams, and onions can generally be obtained, and the West African frontier force has a regimental farm at Jebba; fresh milk may be procured at certain places, especially between Shonga and Rabba.

Navigation of the Niger above the Delta.—The successful navigation of the river depends entirely on local knowledge, and it would be well for all strangers to employ pilots, or canoe men, well acquainted with it. The soundings must only be taken as an indication of the general depth, as after every season of flood they vary considerably, and the channels are constantly changing; snags are frequently met with. The valley of the Niger and islands are almost entirely submerged during September.

The current varies from an average of 3 knots in October, November, and December to 2 knots in April. The wind is generally blowing up the river or against the stream, so that when at anchor the vessel is stern to wind.

Principal towns and trading posts on the Niger above the Delta—Atani.—Between Abo and Atani, a distance of about 30 miles, the river, rolling down from the north in one vast expanse, presents a noble appearance; the banks are flat and covered with tall guinea grass, among which may be seen the low mud Ibo dwellings, surrounded by little plantations of yams, bananas, and sugar cane, while immense cotton trees rise up at intervals among the grass, and luxuriant creepers and orchids hang over the banks.

About 12 miles above Abo, on the same bank, in Okpai, the company's trading station, and nearly midway between Abo and Atani are the trading stations named Utchi and Munanke, the former on the right and the latter on the left bank. All these are trading ports, where wood for steaming purposes may be procured.

Atani, also a station of the Niger Co., is an important oil market, being the center of a large palm-oil producing district. The trading is chiefly carried on by women.

Abutshi.—From Atani to Abutshi the distance is about 8 miles, and between is the trading station of Odekwe, all situated on the left bank. The trading and wooding station of Abutshi is picturesquely situated on an overhanging cliff, festooned with dark-green creepers, and the iron store sheds line the river bank, the agent's house standing back with an avenue of palms leading to it. Here is a well-kept garden containing fruit and flowers, and in the vicinity cocoa, coffee, and pineapples are grown, and there are a few cattle and horses. Abutshi is one of the largest stations of the Niger Co., and the commercial headquarters of the Igara District. The native town of Abutshi, a few miles inland, is inhabited by a wild and lawless people.

Onitsha.—This town, the headquarters of Onitsha District, is an important commercial center situated on the left bank of the river about 2 miles above Abutshi and just below the confluence of Anambra Creek; the bush in the vicinity has been cleared, roads constructed, and numerous buildings erected.

The principal government establishments are situated on a hill known as the Ozala, 400 feet high.

Four European factories, the postoffice and customhouse, stand on the river front at N'kissi, and there are schools, a church, and small European hospital, with resident medical officer and European nurses.

Onitsha is in telegraphic communication with the rest of the protectorate, and a submarine telegraph cable crosses the river to Asaba.

Supplies are plentiful.

Anchorage.—A vessel should anchor nearly abreast the landing shed and westward of a line joining two cotton trees, situated northward and southwestward of the landing place. The stream runs at rates of from $3\frac{1}{2}$ to 5 knots an hour. It is not safe for vessels drawing 10 feet to remain at Onitsha after the middle of November, and the river steamers drawing from 6 to 8 feet lay up about that time.

Between Onitsha and the Mohammedan town of Egga, a distance of 180 miles, the navigation is difficult, the channel being obstructed by rocks and the current running swiftly.

Asaba, on the right bank, is about 3 miles above Onitsha.

The Amamzara River, a small tributary of the Niger, enters that river nearly opposite Asaba; it is from 200 to 300 yards wide at its mouth, and well wooded down to the water.

There are three trading stations belonging to the Niger Co. on this river. Gloria-Ibo, the first, is a picturesquely situated little place with a factory standing about 100 feet above the river and is said to be more healthful than most of the stations of the Lower Niger district. Igbaku, the second, is situated on the left bank, the native town, inhabited by Ibos, being 1 mile or more inland. Ogrugu, the northern of the trading posts on the Amamzara River, is about 50 miles from the entrance; it stands at an elevation of 80 feet above the river and is said to be fairly healthful.

Idah.—Between Asaba and Idah, on the right bank, is the small trading station of Illushi, the trade of which chiefly consists of rubber and gum copal. The above are all wooding stations.

At Idah, about 45 miles above Illushi, the river is narrowed by islands in the center, being about 700 yards broad on the side of the town.

Idah is an important town in the Igara country, and the northern town in Southern Nigeria; it is large, and picturesquely built on red cliffs, about 200 feet high, which overhang the river.

Anchorage.—There is anchorage off the town of Idah in 8 fathoms; the current runs about 3 knots an hour.

Products.—The products of the stations south of Lukoja are confined almost entirely to palm oil, kernels, and rubber, though a small trade is done at some places in pepper, copra, and gum copal.

Dangers.—In the intermediate rocky region between Idah and Lukoja, the existence of several dangers has been reported, but as the channels are well known there is little danger up to within 2 miles of Lukoja, where Sacrifice Rocks form a serious obstacle to navigation; a channel with 10 feet at lowest water is buoyed. It should be remembered that from the annual changes in the bed of the Niger the channel of one year is frequently useless for another.

Lukoja, about 43 miles above Idah, and situated on the river bank at the foot of Mount Patteh, is essentially a modern town, peopled by no particular tribe, and having an ever-changing population; the few permanent residents are the employees of the government. This is the first Mohammedan place met with in the river.

Situated at the junction of the Binue River with the Niger, it forms a convenient place for traders from all parts to meet and exchange their goods, and is therefore one of the most important centers of the Niger Co.

Mount Patteh rises 1,160 feet above the river, and is at its summit an almost level plane, about $1\frac{1}{2}$ miles in length, and from 3 to 4 in

breadth; it is well wooded, in the dry season well stocked with deer and other game, and commands extensive views of the surrounding country.

Climate.—At Lukoja the total rainfall during the year 1904 was 41.7 inches, or 18.1 less than the preceding year. The maximum shade temperature was 102° on March 11, and the minimum 57° on December 23; the highest mean monthly temperature was 86° in March, and the lowest 79° in July, August, September, and December. The general direction of the wind between May and December, inclusive, was southwest.

Communication is maintained between Akassa (at the mouth of the river) and Lukoja by steamers and steam launches, but the communication with Burutu, which is weekly, is more certain. Above Lukjo communication is maintained on the Binue as well as on the Niger by light draft steamers and steam launches. A telegraph is laid to Jebba (via Egga) which is in telegraphic communication with Lagos, and consequently with the British Islands and elsewhere.

Supplies.—Sheep, goats, fowls, eggs, yams, and onions, and occasionally beef, may be procured, and wood for steaming purposes obtained. There are some good workshops, and about 200 tons of coal are usually in stock.

Sosso Kuso, about 21 miles above Lukoja, is a small trading station, situated on the right bank, in a grove of lofty palms at the foot of a range of forest-clad hills.

Egga.—From Sosso Kuso to Egga the distance is about 53 miles, and on the left bank, about 20 miles from the former place, is the small trading and wooding station of Sokun.

The town of Egga, with a population of at least 6,000, is an important commercial center, being the meeting place for traders from the upper Niger, Kano, Ilorin, and many other large districts; it stands on a low sandy spit of land. The huts are huddled together regardless of any order; the lanes are narrow and filthy; in the wet seasons parts of the town are inundated by the river, and the whole place gives forth a stench which at times is unendurable; there are a few rough, barn-like mosques.

Egga is in telegraphic communication with Lukoja and Jebba.

The factory of the Niger Co., consisting of excellent quarters for the agents, with rows of iron store sheds on either side, overlooks the river, and is surrounded by a high wall. Wood for steaming purposes can be obtained.

Wanangi River.—About 8 to 10 miles above Egga on the northern bank is the entrance to the river Wanangi, and about 35 miles up this river is the town of the same name, consisting of conical-shaped huts standing on the edge of the river; it contains about 1,500 in-

habitants, and is the port of Bida, the Nupe capital, where there is a British resident.

The Niger Co.'s steamer *Soudan*, about 120 feet in length, and drawing $5\frac{1}{2}$ feet of water, ascended this river to Wanangi, but owing to the sharp bends she took the ground on several occasions, and the boughs of the overhanging trees did a great deal of damage in carrying away awnings, stanchions, etc.

Egbag.—From Egga the direction of the Niger is westward, and at 31 miles is Egbag, situated in a dismal-looking swamp; the trade at this place is poor, the principle articles being shea butter, hides, kernels, pepper, and rice.

Kuduna River.—About 42 miles above Egga the Niger is joined by Kuduna or Lafun River. The Kuduna at Muraji (at the entrance) begins to rise about the end of the first week in August, attaining its greatest height about September 1. Its fall like its rise is sudden, and by the third week in September it will have fallen 12 feet, and by the end of October will in some places be hardly possible for large canoes. Zunguru, the seat of government of northern Nigeria, is situated on the Kuduna River in about latitude 10° north. It is connected by telegraph with Lagos via Jebba.

Shonga is a trading station on the right bank of the river in the elbow below Rabba. Pasha is 5 miles below Shonga.

Rabba.—From Egbag the direction of the river is northwestward to Rabba, a distance of 50 miles. Rabba, formerly the capital of Nupe and the burial place of its kings, is now little more than a village; the red cliffs above the town, walling in the water of the river, and the white walls of the company's factory relieving the monotony of the clusters of small grass huts studding the undulating country make it one of the most picturesque places on the river. The trade consists of shea butter, hides, kernels, gum arabic, Igara kernels, pepper, and rice.

Above Rabba the Niger Co. have stations at Jebba; at Fort Goldie, on the right bank, opposite the town of Bajibo; and at Liaba, on the right bank, about 22 miles above Fort Goldie.

Communication.—Fort Goldie is in telegraphic communication with Jebba.

Jebba is a place of considerable importance, as here the caravans from Kano and Sokoto cross the Niger on the way to Ilorin and Lagos. There is a health station at Jebba. Just above Jebba is a remarkable rock in the river, 300 feet high, named Mount Kesey. Wood for steaming purposes may be obtained at Pasha, Rabba, Lar, Jebba, and Liaba.

Communication.—Jebba is connected by telegraph with Lagos Ilorin, Ogbomostro, Fort Goldie, Egga, and Lukoja.

The Lagos-Kano Railroad crosses the river at Jebba.

Binue River, which joins the Niger immediately below Lukoja, rises in Adamawa, in about latitude $7^{\circ} 10'$ north and longitude $13^{\circ} 20'$ east. For the first 100 miles it is a rocky mountain stream, but after being joined by the Mago Kebbi takes a westerly direction and becomes navigable for boats drawing about 4 feet. At its junction with the Niger it is about 1 mile in width.

It has been ascended by the officials of the Niger Co. until it becomes an unnavigable stream, flowing among the rocks of the Bubanjidda Mountains. At Ibi, in approximately latitude $8^{\circ} 10'$ north, longitude $9^{\circ} 45'$ east, 105 miles above the confluence, the annual rise takes place on June 1; at Yola, 208 miles farther up, on July 1.

Wood for steaming purposes may be obtained at the following places on the Binue River: Mozum, Amaran, Amagede, Arago, Abinsi, Ibi, Donga, Jiru, Lau, Djen, Bula, and Yola.

The river bed is subject to changes from the continual shifting of the sand banks, and during the dry season, when the Binue is not navigable for anything larger than launches, the company's officials, in their frequent canoe trips from station to station, examine the channels; a few of their native employees are trained as pilots.

Climate.—The valley of the Binue is unhealthy and infested with mosquitoes and tsetse.

Mozum, the first station of the company on the river, and about 7 miles from the Niger, is situated on the left bank, which is here fringed by baobab trees; the trade is principally in india rubber and gutta-percha.

Bofu, about 10 miles above Mozum, also on the left bank, is a very dirty village, consisting of a number of round grass huts, erected close to the water; the trade at this station is principally in rubber and gutta-percha. All this part of the river is sparsely populated.

Loko, about 55 miles above Bofu, and situated on the right bank, is a clean town, with a population of about 4,000, and, as the port of the State of Nassarawa, has some importance. Here the Niger Co. has a large trading station.

At 15 and 30 miles, respectively, from Loko are Odeni and Arago, both company's trading stations, situated on the right bank, the trade at the former being rubber and gutta-percha and at the latter gutta-percha and benni seed. Abinsi, on an island, is another trading station about 33 miles from, and has the same articles of trade as, Arago; the town is surrounded by a mud wall, and the inhabitants are agriculturists and fishermen.

About 5 miles eastward of Abinsi, the Katsena-Allah River discharges on the southern bank. Here the country becomes more open and freer from forests, with patches of grass sometimes 7 feet in

height; when this dies down, in the dry season, the country swarms with game, the deer roaming about in large herds. The river flows through the heart of the Mitshi country, and on the eastern bank, 45 miles within the entrance, is the trading station of Palava; about 80 miles above Palava the Niger Co. has another trading station, named Katsena-Allah.

About 11 miles eastward of the entrance to the Katsena-Allah River, and on the same bank, Mount Herbert, a solitary hill covered with verdure, rises to the height of about 400 feet straight from the plain.

Ibi.—Between Loko and Ibi, a distance of about 127 miles, the natives on both banks are treacherous, especially those on the southern side. Ibi is an independent Juko town, Wukari, the capital, being situated about 35 miles southward. This is the headquarters of the Niger Co., in the Binue, and in addition to the various store sheds there is a cool thatched bungalow, surrounded by a well-kept garden.

Above Ibi the river still continues a magnificent stream, more than 1 mile in width; on the northern bank is the Muri Kingdom, and on the southern, after passing Zhibu, a trading station, and the mouth of the Donga River, the Bakundi Kingdom commences.

Donga River.—The Donga River is entered about 4 miles eastward of Zhibu, the land near the entrance being low and swampy, with a few large trees scattered about among the high grass, and here, with a high river, this stream is about 300 yards wide, but in the dry season is unnavigable for anything but canoes. Donga is situated about 60 miles from the entrance on the eastern bank; it contains from 4,000 to 5,000 inhabitants, and has a factory belonging to the Niger Co. close to the river and outside the wall of the town. Trade is not very prosperous and is confined chiefly to rubber and gutta-percha.

This part of the Binue has few villages or inhabitants, and is densely wooded, with occasional open plains of high grass.

Terabba River.—About 40 miles above Donga River, and on the same bank, is the entrance to Terabba River, which, flowing north-westward, discharges into the Binue through three or four mouths, the principal outlet being not more than 150 yards wide, but above this the river opens out to about three times that width, but again narrows higher up; the banks are fringed with reedy grass.

There are a few villages on both banks of the river, the largest being Sindidri, on the left bank, where the Niger Co. has a large iron store shed as a depot for Bakundi.

A few miles before reaching Bakundi the Albemarle Mountains slope down to the river on the right bank, and a little higher up there is another range on the left bank. Bakundi, about 35 miles

from the entrance to the river, is a large and scattered town with about 5,000 inhabitants; the Niger Co.'s trading station is built on the edge of the town and between it and the river; the trade, which is said to be declining, is in ivory.

Mainaraiwa, about 45 miles above Elisa Island, and situated on the left bank, is one of the Niger Co.'s. wooding stations, and here are three very large boabab or monkey bread fruit trees; 1 mile farther up the river there is a trading station and the small river and Muri village of Mainaraiwa; the inhabitants of the latter are wild and uncivilized, but not numerous. The chief trade of this place is in gum arabic.

Between Elisa Island and Mainaraiwa the country becomes more open, and here there are numbers of dum palms, not previously seen among the other trees; in the distance low ranges of hills break the hitherto monotonous outline of the forest.

Lau, on the left bank, about 18 miles above Mainaraiwa, is a small branch trading station; large quantities of tin, apparently of good quality, are collected from streams near the hills and brought into this station, and the agent of the factory professes to have found between 60 and 70 different kinds of gum in the district.

Djen.—After leaving Lau the scenery becomes very fine, ranges of hills appearing on both sides; on the northern the Muri Range, some 6 or 7 miles from the river, rises to a height of several thousand feet, and on the southern, distant about 15 miles, is the Fumbina Range; this part of the country is very thickly populated and completely unexplored on both sides of the river. Djen is a small pagan town, situated on the right bank, about 10 miles above Lau.

Numan, a prettily situated village and trading station on the southern bank, is about 25 miles above Djen; it is surrounded by cultivated land, millet, cassava, and maize being grown. **Yola**, about the same distance above Numan, and on the same bank, is on the borders of the Kingdom of Adamawa, a Mohammedan dependency of Sokoto. Above Yola the scenery of the river varies considerably, sometimes hills sloping down to the very riverside, at others vast expanse of swamp, studded with large trees, while a little farther on the river flows through black walls of forest, above which, in the distance to the south, may be seen the tops of the mountains of Alantika rising to a height of about 8,000 feet.

Opposite Numan, about 35 miles below the town of Yola, the Gongola River joints the Binue on the right bank. This river is navigable for small steamers drawing $2\frac{1}{2}$ feet as far as Nafada, a distance of 150 miles from its confluence with the Binue, from the middle of September to the end of October.

About 40 or 50 miles above Yola the Binue is joined by the Faro, flowing from the south. With a high river at its entrance it exceeds

the Binue in width, but is far shallower and cut up with numerous small islands. Beyond this, after passing the village of Tepe on the northern bank, the Binue narrows, in some places being not more than 300 yards wide, and, flowing with a rapid current through dense jungle close to the water's edge, has in the channel a depth of 16 fathoms.

Garua, the farthest station of the Niger Co. on the Binue River, is a small but clean town, situated on the northern bank, probably about 30 miles above the junction of the Faro with the Binue; the country round is fairly well cultivated, but being flat is subject to flooding during the wet season; large herds of cattle and some good-shaped little horses are kept by the Fulas. Here the river is about 600 or 700 yards wide, and 6 to 7 fathoms deep in the channel at high river. This is the highest point reached by the Niger Co.'s vessel *Boussa*, a stern-wheeler of 400 tons, drawing 5 feet of water when loaded.

Kebbi River, supposed to rise in the Tuburi Marshes, and entered about 10 miles eastward of Garua, is about 250 yards wide at the entrance; here the Binue, which now takes a southerly direction toward its source, is upward of 600 yards wide. The average depth in the Kebbi at high river is from 10 to 12 feet.

A small stern-wheeler, belonging to the Niger Co., about 60 feet in length and drawing 15 inches of water, ascended the Kebbi in September, against a 4-knot current, to what was a lake or large marsh at high river. This lake, named by the natives Nabara, was about 3 miles long by 2 miles wide, with a very large village (Bifara) on its northern shore. It was found impossible to reach this village, as the stream was not more than 2 feet deep and from 15 to 20 feet wide.

Between the entrance of the Kebbi and Nabara Lake, several villages are passed, but about 5 miles below the lake a deserted strip of country is passed through.

There are patches of cultivation on both banks, and some ranges of mountains from 1,500 to 2,000 feet high. A short distance from the entrance, Mount Katie, about 800 feet high, well wooded to the summit and situated from 5 to 6 miles from the river on the southern bank, is a noticeable feature, and from its isolated position served as an excellent point on which to take angles for mapping purposes.

CHAPTER V.

CAPE FORMOSO TO THE KAMERUN RIVER—BIGHT OF BIAFRA.

General remarks.—The bight of Biafra is an extensive indentation, with a coast line about 600 miles long, between Cape Formoso to the north and Cape Lopez to the south. The straight line between these two capes extends about 333 miles and almost touches the northeastern point of Princes Island, which is situated nearly midway between the above capes.

Within the limits of the bight numerous rivers, including some of the mouths of the Niger or Kwara, Old Calabar, Kamerun, Gabon, and other streams of less importance fall into the sea. In the extreme northeastern angle of the bight the waters of the Kamerun River, with those of numerous affluents, join the ocean, while on its northern shore, closely bordering on the sea, rises the Kamerun Mountain, the highest peak of which, Mongo-ma-Loba, reaches an elevation of 13,350 feet and is covered with verdure and trees of luxuriant growth except in the vicinity of its rounded summit.

Although numerous hills rise from the sides of the Kamerun Mountain, they appear so inconsiderable when compared with the central peak as scarcely to break the uniformity of the gradual ascent. The more distant Rombi Mountains, however, which lie 30 miles northward of Kamerun Peak, tower aloft in huge peaks and rugged masses whose summits attain the elevation of 4,000 to 6,000 feet, and are visible 60 miles. The highest bears about 8° distant 44 miles from Kamerun Peak, the intervening space lying between the bases of these mountains consisting of a plain from whose surface several conical hills abruptly rise.

Kwa Mountain, 65 miles northward of Kamerun Peak, is 5,500 feet high, and can be discerned from a distance of nearly 80 miles. Most of the above mountains, as well as the island of Fernando Po, are extinct volcanoes.

The sea boundary of the Kamerun Mountain, the base of which occupies a space nearly 20 miles in diameter, in several parts consists of low cliffs, perforated with caverns, having in many instances a very extraordinary appearance. In one place, two of the largest communicate with each other by means of an extensive gallery, pierced from without by a line of holes at equal distances, strongly resembling an excavated fort.

Cape Formoso, which is low and wooded, forms the extreme southern extension of the delta of the Niger; it is the general name given to the low wooded tract forming the southern extension of the delta of the Niger and of which Palm Point is the extremity. The line of coast from the cape to Rio del Rey is almost flat, appearing of a dark color. It is intersected by several rivers, of which the more important are the Bonny, the New and Old Calabar, and Rio del Rey. These are, however, generally difficult of access, each being obstructed by a bar at its outlet.

From Cape Formoso the coast trends about east to West Point, $3\frac{1}{2}$ miles distant.

Brass River, also known as Rio Bento or St. John, is situated 9 miles eastward of Palm Point and 4 miles eastward of Cape Formoso, the intervening land being a low, flat sandy shore upon which the surf breaks heavily, and with forest trees close to the water's edge. Brass River is formed by several branches of the Niger River, one of which, Ekole Creek, is navigable for steam launches of 5 feet draft; a shallow flat is situated at its northern end where the creek enters Nun River.

The entrance to Brass River, $\frac{3}{4}$ mile wide, between East Point and Base Point, appears well defined, when bearing about 321° .

East Point and West Point appear in line when bearing 28° , and the western breakers will serve to point out the entrance of the river when approached from the westward; when approached from the eastward, West Point is difficult to distinguish.

Within the entrance points the river expands to nearly 2 miles in width abreast the factories, which breadth it maintains as far as Opulobo or Big Island, situated nearly in the middle of the river, 4 miles from the entrance.

The river can not be ascended much above Nimbi Creek.

Settlement.—The commissioner for the Brass District resides here in the house which was formerly the British consulate, situated on the eastern bank 1 mile northward of East Point. A Government medical officer is also stationed here. There are three factories extending $\frac{1}{2}$ mile northward of the Government pier, where the hard ground ceases. The mission house fronting the river is situated to the southward of the Government buildings.

The native villages of Tua and Spiffstown are hidden by trees. There are good roads of sandy soil leading to Little Fishtown and the mission chapel near East Point.

Piers.—There are two piers, with depths of 11 and 16 feet alongside, respectively.

Communication.—The steamers of the Elder Dempster Co. call here. Steamers of the Woerman Line also call. Mails from Europe

arrive by canoe or launch through the creeks from Bonny via Degama, dispatched from Bonny on the arrival of the outward mail there fortnightly, and may be expected to arrive on the second day after.

Supplies can not be depended on. In Tua, with a little notice, a native contractor will generally supply a limited quantity of fresh meat, vegetables, and bread. Rain water collected from the roofs of houses and stored in tanks is exclusively used by Europeans; the supply is almost exhausted at the end of the dry season.

Only a very small quantity of coal is obtainable.

East Point.—The eastern entrance point is thickly wooded, but the trees, which appear as a steep bluff, do not reach the water's edge. From East Point the line of the coast with no distinguishing feature continues unbroken to the eastward and is a sandy shore, upon which the surf is generally breaking heavily, with forest trees close to the water's edge.

The coast northward of East Point turns sharply to the northeastward, forming the left bank of the river; mangroves and swamps commence $1\frac{1}{2}$ miles from East Point, where the settlement ends.

Mail Point, on the eastern bank, opposite the southern point of Opolubo, appears as a sharp bluff of tall, dark mangroves, and here the river is $\frac{3}{4}$ mile wide between Thistle Point and Mail Point.

West Point, the western entrance point $1\frac{1}{2}$ miles southwestward of East Point, is low, sandy, covered with small bushes, the forest trees being 300 yards from high water mark. Though this point takes a rectangular turn in its direction, yet from its situation with reference to the entrance across the bar to the southeastward it is difficult to make out.

Bar—Beacon.—A white pyramidal beacon, 35 to 40 feet high, with a topmark visible 7 miles, is erected inside near the shore, 670 yards northward of West Point.

Northward of West Point the coast line trends northward 1 mile to Base Point, forming the right bank of the river; it then turns to the northwestward, forming West Bay, when the entrance to Akassa Creek is reached, $2\frac{1}{2}$ miles within the entrance.

Mangroves and swamp begin at Canoe Point and thence the right bank continues in a direct line northward to the southern extremity of Opolubo Island. Here the river is a mile wide between Hawk Point and Owl Point on the western shore.

Opolubo Island, wedge-shaped, and situated in mid river $3\frac{1}{2}$ miles within the entrance, consists of swampy ground with high mangroves.

Western Spit extends southward from West Point for $1\frac{1}{2}$ miles, with a depth of only a few feet at low water, and always breaking

heavily in the calmest weather at high water. The eastern edge is nearly straight with deep water close-to.

Western Breakers are the continuation of Western Spit, curving around to the east-southeastward for 2 miles farther, and then turning to the northeastward with increasing depths to unite with the Bar Crossing.

All approach to Western Breakers is rendered dangerous by the heavy rollers that break at frequent intervals even at high water, its outer edge being comparatively steep.

The bottom is of sand on the breakers and of mud immediately outside them.

Shore Spit comprises the shoal area extending southward and southeastward from East Point for $3\frac{1}{2}$ miles, where it unites with the Bar Crossing. Shore Spit breaks in fine weather at half ebb and there are always heavy rollers upon and to the southward of it, within the influence of which it is dangerous for a vessel, particularly a sailing ship, to get, as both flood and ebb streams set toward the spit.

Beware Shoal is the shallow patch on Shore Spit near Bar Crossing, which has a depth of 9 feet and is situated about 3 miles 135° from East Point. In the prevailing southerly swell it breaks heavily, and sometimes at high water.

Outer anchorage.—Vessels arriving off Brass River should anchor in 6 fathoms, with West Point bearing about 31° or farther eastward in the same depth on the range line with East Point bearing about 323° .

Bar crossing is that part of the bar uniting the Western Breakers and Shore Spit; here is the deepest water between these two extensions of shoal ground. The general depths in the crossing are 11 to 12 feet; the bottom is sand on the bar and mud on either side.

The ship crossing is between Western Breakers and Beware Shoal, a distance of about $\frac{1}{2}$ mile; here the breakers were observed to occur less often. Frequently in the wet season, and generally in the dry season except during the last half of the flood tide, the bar breaks all over, and there is generally a long swell.

From experience gained by the boats engaged upon the survey, in the dry season it was found only on the calmest days safe for the boats to work upon this crossing except near high water, the best time being before the sea breeze had set in.

The rollers were noticed to curve round from their generally northerly direction on Western Breakers and to follow the direction of the bar to the eastward; they would thus be broadside on to all craft when upon Ship Crossing.

It is not recommended to pass northward of Beware Shoal, although the depths are practically the same as in Ship Crossing; the

increased heavy swell and a roller breaking on Shore Spit is generally likely to continue inshore to Breaker Point, off which there is shallow water and heavy breakers.

Buoy.—A red conical fairway buoy, surmounted by staff and diamond topmark, has been established in a depth of 24 feet at low water springs, in a position from which the Bar Beacon bears 308° , distant about 4.9 miles.

No dependence should be placed on this buoy.

Tides.—It is high water, full and change, at Brass at 4 h. 40 m.; springs rise $6\frac{1}{2}$ feet, neaps $4\frac{1}{4}$ feet; neaps range $2\frac{1}{4}$ feet.

The flood stream begins $4\frac{3}{4}$ hours before high water and runs $5\frac{3}{4}$ hours, with a maximum rate at springs of $2\frac{1}{2}$ knots; the ebb stream begins $1\frac{1}{2}$ hours after high water, and runs $5\frac{3}{4}$ hours, maximum rate $3\frac{1}{2}$ knots. During the rainy season the ebb stream attains the rate of $5\frac{1}{2}$ knots at springs.

High water slack occurs an hour after high water and lasts one-half hour. Low water slack occurs three-fourths hour after low water and lasts one-half hour.

Pilots.—The masters of vessels lying in the river occasionally act as pilots.

Landmarks.—The relative positions of East and West Points serve as a guide to recognize the entrance of the river, and if the weather be clear, the east or right termination of a long, uniformly flat-topped ridge on the skyline, composed of tall trees situated 3 miles northwestward from East Point, appears as a well-defined shoulder or fall of a hill, and opens out when East Point bears to the northward of 323° . The trees along the shore eastward of East Point are of uniform height, without any distinguishing feature. West Point is difficult to make out if approached from the eastward.

Approaching from the westward, Nun Entrance having been passed, when East Point opens out bearing 26° , the entrance of Brass River will be apparent.

Directions.—Vessels should not load above 15 feet draft.

The best time to cross the bar is during the last quarter of the flood; entering before half flood there is every probability, especially in the rainy season, of meeting a strong ebb stream. There is always a heavy swell on the bar which is broadside on to a vessel when crossing.

Having made out the entrance from the offing and being in not less than 6 fathoms, a vessel should steer in with the beacon near West Point bearing 307° ; this leads over the bar, which is here about 1,200 yards wide, in 11 feet least water at low water springs between the termination of Western Breakers and Beware Shoal. Or, the fall of the hill previously described, kept just shut in by East Point bear-

ing 324° will lead over the bar in nearly the same place and in the same depths. There is another somewhat similar shoulder bearing 352° from East Point, but attention to the bearing will prevent this being mistaken for the one forming the range mark. On no account should the fall of the trees be kept open of East Point.

As the water deepens to 16 feet (low water), showing that the bar is crossed, a vessel may continue with the beacon ahead bearing 307° or if heading for East Point on a 324° course alter course to 307° . The eastern edge of Western Spit is steep-to, and the shore northward of West Point is also steep-to, and can be approached as near as 400 yards in safety. When East Point bears 9° , or shortly after the land westward of West Point is shut in, course should be altered to 349° , passing about 600 yards from the western shore. East Point should not be approached too closely; the shoal bank that extends southward for $\frac{1}{2}$ mile is steep-to; allowance must be made for the ebb streams if making, which will be found to set a vessel to the eastward. With Base Point or East Point abeam alter course to the northeastward, bringing Mail Point, which appears as a well-defined bluff of tall dark trees, to bear 34° ; this leads to the anchorage midway between Harrison Spit and the eastern shore.

If the weather be hazy on rounding East Spit about 800 yards distant, it is better to keep over to the eastern shore, which has deep water close-to, to insure being clear of Harrison Spit.

During the harmattan season vessels are frequently obliged to wait outside for several days till the weather clears sufficiently to make out the land. In the rainy season also the entrance is often obscured even when in 5 fathoms of water.

Inner anchorage.—Vessels anchor in $4\frac{1}{2}$ fathoms, mud, off the Government pier about $1\frac{1}{4}$ miles above East Point and 670 yards from the shore, taking care to have West Point open, so as to get as much of the sea breeze as possible. Merchant vessels anchor more to the northward abreast the factories. Vessels are very liable to foul their anchors and drag on a strong ebb stream.

Fishing nets are generally found extending across the inner part of the channel and of the anchorage.

Akassa Creek, on the right bank nearly opposite the settlement at Brass, affords communication between Brass River and Nun River entrance, and is available for vessels of $4\frac{1}{2}$ feet draft, by passing over the flats through Steamer Creek; here the tidal streams from the Niger and Brass meet and separate, and the navigation is difficult.

Boats can cross the flats in Akassa Creek at not later than three-quarters ebb. A favorable tide will be carried through all the way by taking care to arrive on the flats at about high water, the ebb tide running out through both eastern and western arms of the creek.

This creek is principally used by large steam launches of light draft, which carry the mails, etc., between Akassa and Brass; they generally enter it at half flood.

Tua Creek.—This small creek, on the eastern bank 1 mile above East Point, and nearly dry at low water, is used only by canoes; it leads to Tua, a large native village, hidden by trees, 1 mile inland, where the creek ends in swampy ground.

Akwamobugo or Fishtown Creek is entered on the left bank about 4 miles above the settlement; it has a southerly direction for $5\frac{1}{2}$ miles, then westerly for $2\frac{1}{2}$ miles, with several bends to Fishtown, and has depths of 16 to 18 feet at high water below Fishtown; its general width is about 200 yards, but it is exceedingly narrow in places.

Nimbi Creek is entered about 17 miles above East Point, and the Brass River to the entrance of the creek presents no great difficulties in navigation for vessels of 15 feet draft, but Nimbi Creek is only about from 40 to 50 yards in width, and has very sharp turns in it. Light-draft vessels ascend to Sacrifice Island; steam launches and boats can get to Nimbi, 8 miles up the creek.

The church missionary society has a station at Nimbi where a European resides; a native court is also held here.

Immediately northward of Opolubo Island a flat having a depth of $14\frac{1}{2}$ feet at low water, spring tides, extends right across the river.

Directions.—Leaving the anchorage off the consulate, steer 20° to pass about 600 yards east of Opolubo Island, and toward the low eastern entrance point of Ekole Creek; a shoal, with snags on it, extends about 600 yards southward of the point, and a long narrow bank, which dries at low water, lies about $\frac{1}{2}$ mile southeastward of it; the channel lies between this bank and the point, keeping close to the eastern side of the latter.

About 400 yards beyond the low point there is a small creek, and from this the course is 69° for a gap in the bushes on the opposite side of the river; this gap has low trees on its northern and high trees on its southern side, and the course, allowing for the tidal streams which here run strongly, leads midway between the bank which dries at low water, already mentioned, and a long narrow bank, drying at half ebb, and extending about $1\frac{1}{4}$ miles from the northern bank.

When about 300 yards from the eastern bank of the river, the course should be altered to 24° for 2 miles, passing about $\frac{3}{4}$ mile above the gap, the entrance to Fandrobega or Upper Fishtown Creek, which is large; the entrances to two smaller creeks will be seen on the western bank.

As Bush Point is approached, the eastern bank should be given a berth of at least 600 yards from about $\frac{1}{2}$ mile southward of the

point, then steer across till about 300 yards from the northern bank of the river, and when Bush Point bears 117° gradually around to the eastward, keeping a little more than 200 yards from the northern bank; after passing the eastern point of Iteatoholu (Monkey) Island, gradually alter course to the northward, keeping about the same distance off the western bank and the eastern side of Aganotokula (Whale) Island.

When past Aganotokula Island the river has a northerly direction for about $\frac{3}{4}$ mile, then turns eastward for about the same distance, after which it is again northerly for about $\frac{1}{4}$ mile to the entrance of Nimbi Creek.

Nimbi Creek, about $3\frac{1}{2}$ miles in length, connects Brass River with Nimbi Flats. It is narrow and winding, from 40 to 50 yards in breadth, and could, if necessary, be navigated by vessels drawing not more than $8\frac{1}{2}$ or 9 feet as far as a small island about $\frac{1}{2}$ mile southward of Sacrifice Island, but the turns and small creeks leading off it are numerous.

One Toru, or Ekole Creek, entered about 1 mile northward of Opolubo Island, communicates with the Niger at Ekole, but is only available for vessels drawing $4\frac{1}{2}$ feet.

St. Nicholas River.—This river is situated 11 miles eastward of Brass River, being separated from it by slightly elevated wooded land, the coast of which curves boldly seaward.

The main channel joins Brass River at 9 miles within its mouth; the other channels on the eastern side connect it with Nimbi, Engenni, and Orashi Rivers.

St. Nicholas River is connected with Santa Barbara River by Odiamia Creek.

The eastern entrance point of St. Nicholas River is rounded and difficult of recognition, except when bearing 314° , when the river entrance appears open, but the western entrance point, surmounted by higher trees than those in the vicinity, is readily identified.

Bar.—The bar and channels inside are constantly changing.

Santa Barbara River is situated 10 miles eastward of St. Nicholas River, the intervening coast being low, covered with forest, and fringed by a sandy beach; the banks of this river are thickly wooded, and the entrance appears open when bearing 347° .

The western entrance point is low, sandy, and can not be recognized until close inshore, but from the offing a point, covered with mangroves and situated northward of Odiamia Creek, appears to be the western entrance point; the eastern entrance point is a sloping point, also difficult of recognition.

Bar.—At high water there is a depth of 9 feet on the bar; the channel, situated between heavy breakers on the western side and a

sandy island surrounded by breakers on the eastern side, can only be crossed in smooth weather.

San Bartholomeo River.—This river, situated 7 miles eastward of Santa Barbara River, is easy of recognition, as both entrance points present a bold appearance, being covered with high trees. At a few miles within the entrance the river divides into two branches, separated by a spit of wooded land, which, when seen from the offing, appears to be an island.

Santa Barbara, San Bartholomeo, and Sombrero Rivers are connected by mangrove creeks near the coast.

Coast.—The coast between Santa Barbara and San Bartholomeo Rivers is backed by a sandy plain about $\frac{1}{4}$ mile broad, with several shallow lagoons; numerous hippopotami and buck of various species frequent this plain.

A grassy sand bank extends about 1 mile from the coast at 4 miles westward of San Bartholomeo River, and another sand bank, which covers at high water, at 3 miles eastward of it.

Sombrero River.—This river, situated 10 miles eastward of San Bartholomeo River, does not open out until the entrance bears westward of 333° ; when approaching from the westward the western entrance point appears as a low sloping point with high trees at the back, but when the entrance bears 314° , both entrance points show as high, bold bluffs, and Fouche Point, 9 miles to the eastward, is the extreme of land visible in that direction. Shoal water extends about 5 miles seaward of the entrance, and the channel into the river has not been examined for some years.

The Sombrero, which is connected near its source with Orashi River by a stream known as the N'kissi, rises in about latitude $5^{\circ} 30'$ north, and flows to the south-southwestward for about 30 miles to Ahoada, a Government station and headquarters of the district; the N'kissi is navigable by canoes in the rainy season.

From Ahoada the Sombrero flows southward for 30 miles to Degama, where it is joined by the Engenni, and forms a deep channel from 1 to $1\frac{1}{2}$ miles broad, extending for 28 miles to the sea.

Steam launches at all times can ascend to Ihoaba, situated 4 miles below Ahoada.

Orashi River.—This river rises near N'kwerri, in latitude $5^{\circ} 45'$ north, longitude $7^{\circ} 07'$ east, and flows to the northwestward for about 26 miles, when it bends to the southward for 20 miles, and enters Oguta Lake; Munako Creeks, 7 miles long, connects this bend with Niger River at about 10 miles above the lake.

From Oguta Lake the Orashi flows about 201° , and at a distance of 14 miles is connected with the Sombrero by N'kissi River; at 12 miles below the N'kissi it is connected with the Niger by N'doni Creek.

Orashi River is at its highest level from August to the end of October. Omoko, a large Ibo town, is approached by a creek on the left side just below the entrance to N'doni Creek, and at Kriekana, $1\frac{1}{2}$ miles below this creek, the Niger Co. have a factory.

From Kriekana the river continues in a southwesterly direction for 26 miles, when it divides into two channels, of which that on the right side, known as Okarki Creek, is connected with Brass and St. Nicholas Rivers by a network of creeks; the other branch, known as Engenni River, flows southeastward for 20 miles, when it divides into two channels, the right hand of which, known as Egoribiri Creek, flows into Santa Barbara and San Bartholomeo Rivers, and the left-hand branch, which retains the name of the Engenni, curves to the eastward for about 17 miles, when it joins Sombrero River at Degema.

Fouche Creek, situated 6 miles east-southeastward of Sombrero River, is 700 yards wide at the entrance, and is only apparent when the entrance bears about 314° ; both entrance points are sloping.

Degama Creek, on the left bank of the river, though narrow and tortuous, has a least depth of 3 fathoms; this creek connects Sombrero River with Bugama Creek, and thus forms a means of inland navigation between the Sombrero, New Calabar, and Bonny Rivers.

From August to the end of October the river is at its highest, the estimated rise ranging from 6 feet at the entrance to 25 feet at Kriekana. During this season a small handy vessel of 10 feet draft might ascend from Degama to Oguta Lake. The river begins to fall rapidly after November 1.

There are factories at Degama, on the northern side, and at Abonema on the southern side of Degama Creek, where it joins the Sombrero; also at Bugama, near the junction of Degama and Bugama Creeks, and at Bakana, about 6 miles above, where Bakana Creek joins Cawthorne Channel.

Degama has a considerable trade; bullocks may be obtained.

New Calabar and Bonny Rivers rise between Orashi and Ota Minnie Rivers. Fouche Point forms the western limit of a large bay or estuary, into which the New Calabar and Bonny (or Obane) Rivers discharge their waters. Its eastern limit is Rough Corner Point, 6 miles 82° from Fouche Point.

Fouche Point.—This low point is wooded with high trees, among which the sea breaks at high water; a low, swampy spit extends from 400 to 600 yards seaward of the high-water line. The entrance to Fouche Creek is situated 1 mile northwestward of this point.

Beacon.—A beacon has been erected on Fouche Point.

Fouche Patches, a cluster of shoals with 5 feet least water, lie between the bearings 185° and 217° from Fouche Point, from which they are distant from 1 to $1\frac{3}{4}$ miles.

Breaker Islands, between Rough Corner Point and Fouche Point, are subject to continual change; they formerly consisted of two low, sandy islands, covered with grass, stunted bush, and a few mangroves, but in 1896 they were reported to have disappeared, reappearing 2 years later, and in 1904 consisted of one small low islet covered with grass close to the deep water on the western side of Bonny Channel, 1.4 miles 258° from Rough Corner Point; in 1911 this islet was being washed away and another formed at 1.9 miles westward of the point.

Yellow Island in 1904 consisted of an extensive low sandy spit nearly covered in places at high water, with bushes 30 feet high in places, giving the appearance at a distance of detached islets about $\frac{1}{4}$ mile long. Its northwestern extremity is situated on the western edge of the bank, about $1\frac{1}{2}$ miles northeastward of Fouche Point.

In 1911 this island was of crescent shape, $2\frac{3}{4}$ miles long, and from $\frac{1}{4}$ to $\frac{1}{2}$ mile broad, the northwestern extremity being separated from Calabar Point, Snake Island, by a narrow creek. A similar but inhabited island, $1\frac{1}{4}$ miles long, is situated eastward of Yellow Island, both islands being covered by scrub and low mangroves. Between these islands and Snake Island is a mud flat, which dries at half tide.

Green Island, a small inhabited island, 600 yards long, is situated 1 mile southeastward of Deadman Point.

Islets and sand banks are constantly forming and reforming hereabouts, and the whole of the extensive shallow flat, upon which Breaker Islands and Yellow Island stand, is subject to frequent alteration.

The Child, of hard sand, with a depth of 1 foot at low water springs, is situated 2.3 miles northeastward of the church on Peter Fortis Point.

Deadman Island.—Deadman Point, the southern extreme of Deadman Island, is a round projection covered with mangroves, nearly midway between Peter Fortis and Calabar Points, and $3\frac{1}{2}$ miles 80° from the latter, with Cawthorne Channel (False Calabar River) lying between. Eastward of Deadman Island the coast line consists of a low mangrove shore with many inlets and creeks fronted by extensive drying banks of sand and mud. Egerton Flats, steep to on their eastern side, form the western side of Bonny Channel.

Peter Fortis Point, the eastern extremity of the coast which divides the mouths of New Calabar and Bonny Rivers, is situated 4 miles 23° from Rough Corner Point; on the extremity of this point is a clump of tall forest trees forming a conspicuous mark and visible from beyond the fairway buoy, about 12 miles distant.

The bottom off Peter Fortis Point is covered with long weeds, which are liable to choke the valves of a steamer if the point is

rounded too closely. There is a good place on this point to beach small vessels.

Rough Corner Point, forming the eastern limit of the estuary, is situated 6 miles 82° from Fouche Point; the mangrove bush extends close down to the sandy beach, and the point shows up well from either direction of Bonny Channel. Juju Point lies about $\frac{3}{4}$ mile northeastward of Rough Corner Point. Northward of Juju Point are the entrances to mangrove creeks, whence the mangrove shore trends northeastward for $2\frac{1}{4}$ miles to the settlement of Bonny, where sand beaches occur.

Field Point, a little over 1 mile southward of Rough Corner Point, is low, sandy, and covered with grass, the coast being fronted with mangroves and sand beaches; here the coast changes its direction sharply to the eastward.

Sand Island is a small, bare, horseshoe-shaped sand bank, covered at high water, situated $\frac{1}{2}$ mile westward of Field Point; between this and Rough Corner Point is another sand bank, awash at low water. A continuous line of breakers is seen between Sand Island and Rough Corner Point even at high water.

Tidal streams.—Near Sand Island both ebb and flood streams set toward it.

Rough Corner Spit forms the southern edge of the sand bank which extends about $3\frac{3}{4}$ miles southward from Rough Corner Point; the western edge of the bank is marked by a line of breakers and ripples and forms the eastern side of Bonny Channel.

The southern and western sides of Rough Corner Spit are steep-to and must be approached with caution.

Portuguese Bank, which frequently breaks all over in the rainy season, is an extensive flat of hard sand, extending 5 miles from the shore, with depths of from 13 to 18 feet, and is the eastward continuation of the shoal off Rough Corner Point.

Outer Baleur Bank, $2\frac{1}{4}$ miles long northwest and southeast, with an average width of about 400 yards, is divided from Portuguese Bank by a bar over which are Portuguese and Old Man of War Channels. The shoalest spot on Outer Baleur Bank is a sand head with 6 feet of water over it lying near the center of the bank, about $6\frac{1}{2}$ miles 189° from Rough Corner Point. A detached shoal with 10 feet of water over it lies $1\frac{1}{2}$ miles 70° from the 6-foot spot.

The whole bank breaks at half ebb and in rough weather at all stages of the tide.

Inner Baleur Bank, a narrow ridge of sand 1 mile long in a north and south direction, lies about $\frac{1}{4}$ mile northward of the northern extremity of Outer Baleur Bank.

The shoalest part, with 8 feet of water over it, is 5.1 miles 197° from Rough Corner Point.

In bad weather Inner Baleur Bank always breaks heavily, and even in fine weather it breaks at half ebb.

Inner Patches, two detached shoals 800 yards apart, with 18 feet least water, lie between Inner Baleur Bank and the inner buoy, and are only $\frac{1}{4}$ mile from the mid-channel course.

Western Breakers, separating Bonny and Fouche Channels, are triangular in shape and the continuation of the shoals and sand banks extending southwestward from Breaker Island, interrupted only in one place by the Two Fathom Channel. They break continuously in moderate but not in calm weather. The eastern edge is steep-to, and the lead gives but little warning.

West Spit, a detached sand bank $\frac{3}{4}$ mile long in a northeasterly direction and $\frac{1}{4}$ mile broad, with only 5 feet at low water, forms the southern extremity of Western Breakers.

The southern extremity of West Spit lies about 6 miles 216° from Rough Corner Point, and thence the line of shallow water, forming the western side of Bonny Channel, extends 2 miles northeastward as far as Two Fathom Channel; the western edge of the breakers extends about $2\frac{1}{2}$ miles northwestward from West Spit and then the edge turns back east by south for $2\frac{1}{2}$ miles, forming the southern side of Two Fathom Channel.

Breaker Spit.—On the northern side of Two Fathom Channel the eastern edge of the breakers continues to run northeastward as far as Breaker Islands, while the western edge extends northwestward toward Yellow Island, the whole of the inclosed space being a large flat, which breaks heavily at half tide, even in fine weather. It must be remembered that the flood tide in Fouche and Bonny Channels always sets toward Western Breakers.

Bonny River.—The estuary of this river extends inland as an arm of the sea for 29 miles to Okrika, but the river itself is comparatively small; the bar is more easily crossed than that of any other of the Oil Rivers. From Rough Corner Point the coast trends northeastward for about $3\frac{1}{2}$ miles to Bonny, a large native town which stands on ground nowhere more than 4 feet above the river, the soil being composed of sand and decayed vegetation; there are mangrove swamps close-to, and during the rainy season the site is more or less covered with water; several hulks lie aground on the beach. The commissioner for the district resides here in the former consulate, a large pagoda-shaped two-storied building, with a red roof. The African association is at present the only factory open; their pier, known as Boler's Pier, with a conspicuous zinc roof, is the southern one of two, and forms the usual landing place for passengers as well as cargo. Care is necessary when approaching the pier, as there are many sunken hulks on either side of its extremity and along the

beaches; they are mostly visible at low water. Boats approaching should keep in line with the length of both piers.

A medical officer resides at Bonny.

Communication.—Bonny is the port of entry for Bakana, Duguma, Degama, and Okrika, so that all cargo steamers bound to those ports call to enter and clear.

A weekly Government mail service by steam launch is maintained with Degama, Brass, Akassa, and Opobo.

The ocean mail steamers call fortnightly outward and homeward.

Repairs.—Small repairs can be effected.

The European settlement is close northward of the native town of Bonny, and is partly hidden by a conspicuous clump of tall trees. A chapel is situated $\frac{1}{2}$ mile southward of the commissioner's house near a group of tall cotton trees. There are no roads.

Telegraphs.—Three submarine cables are landed at Bonny—from Brass, Princes Island, and the Kameruns. They lie parallel to the shore of the river, being in some places $\frac{1}{2}$ mile distant. Vessels are cautioned not to anchor in the vicinity of the cables, the positions of which are shown on the chart.

There is also an overland line to Old Calabar, crossing the creeks, via Opobo, Egwanga, Ekot, and Oron.

Supplies.—Beef and other provisions may be obtained in moderate quantities, if notice be previously given. Pigeons may be shot in Bolder Creek in the early morning. No water is available.

Coal.—The Government stock is from 200 to 300 tons, and the annual importation 800 tons.

Four lighters and one steam launch are available.

Astronomical position.—A stone 47 yards southward of Boler's Pier, marking the observation spot, is in latitude $4^{\circ} 27' 19''$ north, longitude $7^{\circ} 09' 56''$ east.

Pilots.—Native pilots can not be obtained.

Outer anchorage.—At no season of the year should a vessel anchor off the entrance of Bonny River in a less depth than 7 fathoms, and a good berth is with Fouche Point bearing 349° in line with Fairway Buoy, which will be about $1\frac{1}{2}$ miles distant. Not less than 50 fathoms of chain should be veered.

Bonny Channel, comprising the narrow and nearly straight channel between Western Breakers and Breaker Spit on the western side, and Baleur Banks and Rough Corner Spit on the eastern side, extends 9 miles northeastward from Fairway Buoy to Rough Corner Point, and is about $\frac{3}{4}$ mile wide in its narrowest part.

Vessels should not load to more than 21 feet draft. Those drawing 18 feet may cross the bar at two hours' flood; and those of less than 12 feet draft can cross at any time of tide.

Note.—The hard sandy bottom of this river extends as far as a depth of 6 or 7 fathoms. At this depth off the other rivers in the vicinity the bottom is invariably of soft mud. In thick weather the Bonny can be recognized by this peculiarity.

Buoys.—There are generally three buoys in Bonny Channel.

The outer, Fairway Buoy, is a red bellbuoy, surmounted by a staff and cage, moored in 33 feet at low water, 9.1 miles 109° from Rough Corner Point.

Middle Buoy, a black can marked BAR and surmounted by a staff and cage, is moored on the bar in 20 feet at low water 7.1 miles 208° from Rough Corner Point.

Baleur Buoy, red conical, and surmounted by a staff and cage, is situated about $1\frac{1}{2}$ miles northward of the northern extremity of Inner Baleur Bank.

None of these buoys can be depended on as to number, position, or distinguishing features.

Directions.—Having arrived off the Fairway Buoy with the Middle Buoy nearly in line with Rough Corner Point, steer in for the latter, bearing 30° . This leads 100 yards eastward of Fairway Buoy and 200 yards westward of Middle Buoy, if in position, in a least depth of 19 or 20 feet at low water, which will be abreast Middle Buoy, the same soundings continuing for 1,000 yards farther, when the water deepens and the bar ends. After passing Middle Buoy the channel contracts and is only 1,200 yards wide between Inner Patches and Western Breakers; the bearing of Rough Corner Point should be carefully attended to. When abreast Baleur Buoy to the westward alter course to 23° , bringing Peter Fortis clump of trees slightly on the starboard bow; this will lead midway between Breaker and Rough Corner Spits, the channel being $\frac{3}{4}$ mile wide between them. On passing Rough Corner Point $\frac{1}{2}$ mile distant, alter course to 39° , which will lead up to the anchorage.

Egerton Flats are steep-to and the lead gives no warning. Near Sand Island both flood and ebb streams set toward the island.

Decreased depth.—A depth of 15 feet has been reported close northeastward of Bar Middle Buoy, where 20 feet is shown on the charts.

Tides and tidal streams.—At Bonny it is high water, full and change, at 4 h. 50 m.; springs rise 6 feet, neaps 4 feet, neaps range 3 feet. The flood stream begins $5\frac{1}{2}$ hours before high water and runs for 6 hours, maximum velocity at springs $2\frac{1}{2}$ knots. The ebb stream begins one hour after high water and runs for five hours; maximum velocity at springs $3\frac{1}{2}$ knots. High water slack occurs one-half hour after high water and lasts one-half hour. Low water slack occurs at low water and lasts one-half hour. The ebb sets over Baleur Bank. The flood sometimes sets over Western Shoals, but if the outside cur-

rent is setting strongly to the eastward, the flood will be but little felt. Near Sand Island both ebb and flood streams set toward the island.

Off Bonny the tide has been found to run at the rate of $3\frac{1}{2}$ knots an hour at springs and $2\frac{1}{2}$ knots at neaps. The average strength is about $\frac{1}{2}$ knot less.

Inner anchorage.—The anchorage for men-of-war off Bonny is in 11 fathoms, over mud, 400 to 600 yards off Boler's Pier. This anchorage is fully exposed to the sea breeze, which if strong creates an unpleasant sea for boats, especially on the ebb tide.

Anchorage off Breaker Island will be found an agreeable change to a vessel that has been some time in the river. Here there is generally a fresh breeze and plenty of fish may be caught with the seine.

Okrika is situated on the right bank of Okrika Creek, about 1 mile from its entrance, 20 miles above Bonny. Abreast the creek which has a depth of 6 feet at low water the river is about 1 mile wide with depth of from 7 to 10 fathoms on the Okrika side, but a large mud bank, which dries, blocks the western half of the channel. The inhabitants of Okrika keep large herds of cattle.

Above Bonny, as far as the entrance to Okrika Creek, the channel depths vary from 6 to 13 fathoms, except abreast of Boler Creek, where a bar stretches across the river having a passage near its center with a depth of 16 feet. Anchorage in 9 fathoms has been obtained in the center of the river northward of the mud bank off the entrance to Okrika Creek.

Trade is carried on between the Bonny and Opobo through Kelole or Opobo and Tullifer Creeks, which connects the two rivers.

NOTE.—Vessels should not anchor at the entrance of Cawthorne Channel so as to interfere with vessels using it.

Okrika Flats—Buoys.—The flats off Boler Creek are marked by three black can buoys, each surmounted by staff and cage.

Two white leading beacons are erected on Allan and Ford Points.

Old Man-of-War Channel.—This channel has not been examined for some years. Vessels leaving Bonny River may cross the bar in 15 feet at low water by using this channel, the southern entrance to which lies 4 miles eastward of Bonny Channel.

In the rainy season it frequently breaks in this channel.

Strangers should not attempt to enter without a pilot.

Portuguese Channel leads between Portuguese Bank to the northeastward and Outer Baleur Bank to the southwestward, and has a depth of 16 feet at low water. This channel has of late years been quite abandoned.

In the rainy season there is a heavy beam sea throughout the whole length of Portuguese Channel, and it not infrequently breaks all over.

Caution.—Mariners are warned that no reliance can be placed on the positions or colors of the buoys at the entrance of the Bonny, New Calabar, or any of the Oil Rivers, as they are frequently either out of position or washed away, especially during the rainy season; but should the buoys be gone, Rough Corner Point, bearing 80° , with Peter Fortis Point kept well open westward of it, will lead over the bar of Bonny Channel in the deepest water; or, should Rough Corner Point be obscured, a vessel must be guided by the Western Breakers, which always show, and should be kept at a distance of about 800 yards.

New Calabar River is entered between Fouche Point and Yellow Island; its western bank, with a general north-northwest direction for 5 miles from Fouche Point, is thickly wooded. The shore is fringed by mangroves in places, and elsewhere thick bush grows close down to the water's edge. Several creeks open into the river on its western side, those by Youngtown and Fouche being the most important.

The direct channels into New Calabar River have seldom been used since the opening of Cawthorne Channel.

Calabar Point, the southern point of the eastern bank of New Calabar River, is situated $2\frac{1}{2}$ miles 5° from Fouche Point. From here a line of thick high mangroves extends along the shore $2\frac{1}{4}$ miles to Cawthorne Channel.

The eastern bank of the river extends north-northwestward from Calabar Point and is lined with mangroves and thick bush. There are two creeks at $\frac{3}{4}$ mile and $2\frac{1}{4}$ miles above Calabar Point, respectively, which lead to Cawthorne Channel.

West Fouche Channel leads between Fouche Patches and the land, in 12 feet at low water, but there are no marks, so the eye and lead must be the principal guides.

To enter, pass the breakers off the eastern entrance point of Fouche Creek at a distance of about 400 yards, and steer 33° for Fouche Point, passing 200 yards northward of the westernmost of the Fouche Patches, then alter course to 62° for the factories at Bonny, rounding the breakers off Fouche Point (which are generally clearly seen) at a distance of 400 yards.

Fouche Channel, leading westward of Western Breakers, is much obstructed by shoals with depths of from 8 to 9 feet, which break at half ebb in fine weather; the whole channel breaks across in bad weather.

To enter.—The best mark for entering is the river bluff on the eastern side of New Calabar River, in line with the extremity of the sand off Fouche Point, bearing 353° , with the mission houses open eastward of the point; this leads through in 11 feet of water. When within $1\frac{1}{4}$ miles of Fouche Point, haul up to 17° for the western side

of the entrance to Cawthorne Channel, passing about $\frac{1}{4}$ mile eastward of the breakers off Fouche Point; thence the course is 331° for 4 miles to abreast of Youngtown. Tumbo and Youngtown should be passed at the distance of 1 mile, to avoid off-lying banks.

Two Fathom Channel is the only navigable channel over the flats between Bonny and New Calabar Rivers, having a depth of 12 feet at low water, but it is seldom used. The eastern entrance is situated nearly 4 miles 217° from Rough Corner Point. The narrow part of the channel is $\frac{1}{2}$ mile long, and about 100 yards broad, on the three distinct bars which have to be crossed. The services of a pilot are necessary.

Cawthorne Channel (False Calabar River) is entered 1 mile westward of Rough Corner Point between the shoals extending eastward of the Breaker Islands and those from the northern shore of Bonny River.

This channel allows vessels to proceed from Bonny to Calabar, Bugama, or Degama at all times, without recrossing Bonny Bar, and although the route is somewhat longer, it is always the one used, as it offers smooth water, is deeper, and can be taken when perhaps the bar can not be attempted.

The bottom in Cawthorne Channel and in the main river is mud and sand, the bank to the northward of the channel is of hard sand, with very irregular soundings. It is not advisable to navigate this channel without a pilot.

Boler Creek, $4\frac{1}{2}$ miles above Deadman Island on the eastern bank of Cawthorne Channel, and joining the Bonny River about the same distance northward of Bonny, is said to be unnavigable except for launches, the channel being obstructed by snags.

Buoys.—Three red conical buoys are established in the channel in a line about $1\frac{1}{2}$ miles apart, and at the northern entrance a black can buoy.

Pier.—A pier has been constructed off the customhouse on the eastern side of Cawthorne Channel, about a mile above Deadman Island.

Directions—Cawthorne Channel.—If proceeding from Bonny to Buguma via Cawthorne Channel steer down the river on the usual course until the lower red conical buoy bears about 235° , when alter course to pass close to each of the three buoys, leaving them on the starboard hand; from the third buoy steer 316° for a conspicuous clump of high trees on the right bank, which may be passed at a moderate distance.

The channel is narrow and liable to changes, but has at all times a depth of not less than 5 fathoms; the western bank is steep, but the eastern is more shelving.

The tidal streams run strongly near the lower buoy, and before attempting the channel it should be ascertained that the buoys are in position.

From the conspicuous clump of trees a mid-channel course should be taken until near the junction of the channel with New Calabar River, when the northern shore should be approached to avoid a shoal marked by a black can buoy, situated northward of the southern entrance point, or a vessel may pass between this shoal, which is steep-to, and the point in a depth of from 5 to 7 fathoms, keeping from 15 to 20 yards from the point; the breadth of the channel is uncertain.

To Bakana.—The least depth in the fairway is 15 feet; the fishing stakes and mud flats, which can be seen, are fair guides for piloting. As a general rule, where there are low bushes of a light-green color with a straight bank, deep water will be found close-to, and high trees with swampy ground should be given a good berth.

Bakana Creek and factory are situated about 6 miles above Cawthorne Channel. Off the factory, and nearly in the center of the channel, there is a bank with 1 foot of water over it, and 1,350 yards farther northward, and in the center of the channel, there is a bank having over it a depth of 13 feet. Bakana Factory, on the eastern bank, is 9 miles above the entrance of Cawthorne Channel. A pilot should be taken and the lead constantly used.

To Degama, by Cawthorne, Haynes, Billee, and Kra Kra Creeks.—The directions for Bugama, via Cawthorne Channel, should be followed until in Bugama Creek.

Haynes Creek is 2 miles within the entrance, on the southwestern bank, and its southern entrance point may be rounded closely and midchannel kept until an island lying off the western entrance of Haynes Creek is seen. A large shoal extends southward and southwestward of this island, but being marked by fishing stakes its extent can be judged; the channel is southward and westward of this island, and thence northward into Billee Creek, which may be navigated by keeping in the bends and avoiding the points.

The same directions apply to Kra Kra Creek (which is really the western portion of Billee Creek) except that, when leaving Kra Kra Creek into Sombrero River, a large shoal fronts the creek, its southern end being marked by a black can buoy. Vessels can pass between this buoy and the shore to the southward. This shoal may be passed on either side, but the channel eastward of it, if proceeding up the Sombrero, is recommended as being less affected by the tidal streams. The northern point of Kra Kra Creek should be rounded as closely as possible, and the eastern bank kept aboard at about half a ship's length until nearing Palm village.

A shoal extends for some distance southward and southeastward of Lilly Point, and here the western bank of the creek must be closed;

after passing Lilly Point the channel lies quite close to the eastern bank, as the shoals off the opposite bank are irregular and extensive.

Anchorage.—Vessels can anchor off the eastern bank of the river at either Abonema or Degama; if proceeding to Degama, care should be taken to avoid a shoal southward of the north entrance point of Degama Creek.

Bonny to Okrika—Directions.—Keep in mid-channel until above Peter Fortis Point, when steer along the western shore, keeping at a distance of about 600 yards until Allan Point is abeam; from this position steer for No. 1 buoy, avoiding Child Shoal, and then from buoy to buoy, leaving No. 1 buoy on the port hand and passing eastward of Nos. 2 and 3 buoys.

From No. 3 buoy steer for the beacon on Ford Point, and then keep 200 or 400 yards from the western shore until abreast of Miller Factory, when cross to the eastern shore until abreast of Okrika Creek to avoid the mud bank on the western side, and anchor in mid river above the creek.

Antonio (Andoni) River.—The entrance to this river is situated 12 miles eastward of Field Point; the bar has not been examined, but is reported to have a depth of 8 feet at low water springs. The western entrance point is bluff and well defined, but the eastern entrance point is difficult of recognition; the river entrance opens out when bearing 35° .

Coast.—Between Field Point and the entrance to Antonio River the coast is low, swampy, and covered with mangroves, etc., having more elevated and fertile land rising at a distance of several miles inland; between Antonio River and the entrance to the Opobo the coast presents similar features.

When navigating between Bonny and Opobo Rivers vessels should keep outside the depth of 8 fathoms.

Landmark.—The beacon on West Point is visible from a distance of about 7 miles when eastward of the river.

Opobo (Imo) River rises in about latitude $6^{\circ} 0'$ north, longitude $7^{\circ} 20'$ east, and flows in a southwesterly direction for about 14 miles and then to the southeast by south for the same distance, being joined by many affluents, and passing about 5 miles westward of Okigwe, a Government station and headquarters of Okigwe District.

Thence it flows south by west for 55 miles to the junction with Ota Minnie River, passing about 15 miles westward of Bende, a large town, and Government district headquarters.

The Ota Minnie, the principal tributary of the Opobo, rises near N'kwerri, close to the source of Oroshi River, in about latitude $5^{\circ} 45'$ north, longitude $7^{\circ} 07'$ east; the Opobo is a thick, muddy stream, and the waters of the Ota Minnie clear; at their junction the streams flow side by side for a long distance without mingling.

The country drained by these rivers is densely populated, and abounds in oil palms, while, except near the river banks, the forest has been almost entirely cleared.

Above the junction of the Opobo and Ota Minnie the channels of both rivers are much obstructed by fallen trees, which in the Opobo are undermined by the swift current, especially during the rainy season; but in 1912 the channel of the Opobo, having a breadth of from 50 to 100 yards and depth of 3 feet in the dry season, was open to Udo, 45 miles above the junction, and that of the Ota Minnie as far as Owerri, a Government district headquarters, in latitude $5^{\circ} 30'$ north. Owing to the current and sharp bends the channels can only be traversed by boats or canoes.

The rise of the river in the rainy season varies from 6 to 10 feet. Below the junction with the Ota Minnie, the Opobo bends to the eastward for 16 miles to Akwete, an important trading center on the left bank.

Aba River (Azuminnie Creek) is a narrow, deep, and swift river, which joins the Opobo on the left bank at 16 miles below Akwete; it is navigable by canoes for 30 miles to Aba, the residence of the district commissioner, and which is connected with Akwete by a good road.

Below the junction with Aba River the Opobo flows in a southerly direction for 15 miles to Egwanga (Opobo), the largest palm oil center in southern Nigeria, at 5 miles above which, on the right bank is Beg River (Ogoni Creek), navigable by canoes for a distance of 12 miles.

Navigation.—From Egwanga to the junction of the Ota Minnie, Opobo River is navigable by steamers of not more than 4 feet draft throughout the year; at 12 miles above Egwanga are situated some shoals, with depths in the dry season of from 3 to 4 feet at low water, and 8 to 9 feet at high water springs; above these shoals there is deep water at all seasons.

The tidal influence is experienced as far as a few miles above Akwete, at which place there is a tidal rise of 1 foot, but the current is always running down the river.

Rivers.—Essene Creek, navigable by canoes for a distance of 10 miles in a northeasterly direction, joins Opobo River on the left bank close above Egwanga, and between that town and the sea, Tullifer and Strongface Creeks branch off on the right, connecting with Andoni River and Ja Ja and Shooters Creeks on the left connect with Kwoibo River.

At 5 miles below the European town of Egwanga, on the right bank, just above Strongface Creek is situated the native town of Opobo.

At Opobo the mangrove belt commences and extends to the coast.

Customs.—There is a customs station on Sandy Point, and vessels entering the river must stop and communicate.

Opobo.—The Government station of Egwanga is situated on fairly high ground, from which factories extend along the river bank to a quarter of a mile beyond Essene Creek.

There are nine flourishing factories at Egwanga, one at Strong-face Creek, and one at Tullifer Creek, but there are no wharves.

European and native hospitals, post and telegraph offices, transport store office, etc., are situated at Egwanga.

Communication.—The intermediate steamers of the Elder Dempster Line call about once a fortnight, and more frequently during the palm oil season; steamers of the Woermann Line also call frequently. A weekly Government mail service with Bonny is maintained.

Pilots.—The only pilots are the masters of steamers who may offer their services.

Native pilots can not be obtained.

Hospital.—The European hospital has accommodation for four patients; there is a resident medical officer, but no nurses.

Beacon.—The beacon on West Point is considered to be reliable.

Telegraph.—Egwanga and Opobo are in communication with the European system by a land line crossing the creeks via Bonny, and to Old Calabar through Eket.

Supplies of meat and vegetables can generally be obtained by prearrangement with the factories, but the resources are very limited.

Climate.—The climate of Opobo is not considered especially unhealthy for Europeans. The anchorage at Opobo, if making any stay, is preferable to that of Egwanga, as the sea breeze which can generally be relied on at Opobo hardly reaches Egwanga where the river is more confined.

The upper portion of the Opobo River is more healthful than lower down; above the mangrove swamps the climate is cool and it is free from mosquitoes and sand flies.

A Government medical officer for the Opobo district resides at Egwanga.

West Point, difficult to distinguish unless bearing to the eastward of 15° , forms the western entrance point of the river, and from it the coast, fronted by a sandy beach with forest trees close to the water's edge, trends north-northeastward for nearly 2 miles to Sandy Point.

From Sandy Point the line of the river turns abruptly northwestward, with an average width of $\frac{3}{4}$ mile, both shores being lined with impenetrable mangroves.

Beacon.—A white beacon about 35 feet high is situated on West Point, but no dependence can be placed on its being maintained.

Caution.—The coast line, especially in the vicinity of West Point, appears to be liable to considerable change.

East Point, forming a tolerably sharp elbow, with forest trees close to the water's edge, is situated $1\frac{1}{2}$ miles 55° from West Point. From East Point the river bank trends northward for 1 mile, where the stream is $\frac{1}{2}$ mile broad.

Bar.—The bar of Opobo River is very shoal and is said to shift its position, more especially in the rainy season. It breaks all over in bad weather, when it is recommended not to attempt to cross, but it is generally easy and safe of access at other times. The bottom is of sand everywhere on the bar, changing to mud on either side.

From West Point the Western Spit, which is steep-to on its eastern side and always marked by heavy rollers, extends in a south-southwest direction for $1\frac{1}{2}$ miles, when it is succeeded by a narrow belt of shallow water forming the bar, with depths of $7\frac{1}{2}$ feet upon it; the bar continues in the same direction for another mile before turning sharply to the eastward to join the shoals extending southward from Eastern Spit; the water there deepens to 10 and 12 feet, with numerous sand heads having 9 feet, difficult to avoid; it is here that the best crossing is effected.

Reported shoal.—The steamer *Sansu* was reported in 1907 to have struck in $5\frac{1}{2}$ feet at low water about 1.9 miles 167° from the beacon on West Point, but nothing less than $8\frac{1}{2}$ feet was found on examination.

Eastern Spit extends in a south-southwest direction from East Point for nearly 2 miles, leaving a deep channel 800 yards broad between its western edge and West Spit. Eastern Spit is nearly dry at low water, spring tides, and always breaks heavily; the western edge is steep-to, but it shelves gradually to the southward, with heavy rollers dependent upon the state of the tide and swell.

Wreck.—The single mast of a wreck was standing in 1904 amidst the breakers on East Spit, with the extremity of the land near East Point, bearing 2° , 1,400 yards distant.

Buoys.—A red conical fairway buoy, surmounted by staff and diamond, is moored in a depth of 21 feet, in a position 167° , distant $3\frac{3}{4}$ miles from the Bar Beacon on West Point. This buoy can not be relied upon.

The buoys are not to be relied upon, either as to position, number, or distinguishing features.

Outer anchorage.—The usual anchorage outside the bar is in from $5\frac{1}{2}$ to 6 fathoms, about 4 miles 190° from West Point, from which anchorage the factories will be clearly seen. The prevailing current being to the eastward, vessels nearly always lie broadside to the prevailing southerly swell.

Tides.—It is high water, full and change, at Opobo at 4 h. 30 m.; springs rise $7\frac{1}{2}$ feet, neaps $5\frac{1}{2}$ feet; neaps range 3 feet.

The flood stream begins $4\frac{1}{4}$ hours before high water and runs 5 hours; maximum velocity at springs, 2 knots.

The ebb stream begins $1\frac{1}{2}$ hours after high water and runs $5\frac{1}{2}$ hours; maximum velocity at springs, $3\frac{1}{2}$ knots.

High-water slack occurs three-fourths hour after high water and lasts three-fourths hour.

Low-water slack occurs one hour after low water and lasts one hour.

At the flats it is high water, full and change, at 5 h. 15 m.; springs rise 6 feet (approximately); neaps 5 feet.

Directions.—Steer in with the beacon on West Point bearing 352° until in a depth of 24 feet at one hour before high water springs, when the beacon will be distant 3 miles; alter course from this position to 331° and cross the bar; when the depths increase and the beacon bears 5° , alter course for it, and proceed midway between the western and eastern breakers.

In 1908 the least depth found was 15 feet at high-water springs and 13 feet at high-water neaps.

In 1912 vessels frequently crossed the bar in the same depth on a straight course by keeping the beacon bearing 2° .

Tidal stream.—The flood stream on the bar sets in a northeasterly direction, for which allowance should be made when crossing.

Western Spit.—The breakers on this spit are gradually extending in a southwesterly direction.

Inner anchorage.—Vessels anchor as convenient off the customs station, Sandy Point.

Egwanga.—Ocean steamers navigate as far up the river as Egwanga, 8 miles above Sandy Point, where the Government and several factories are established.

From Sandy Point to Egwanga.—On rounding Sandy Point steer in mid-channel, 302° ; then 291° as Shooter Creek is approached, the deepest water being found near the left bank. Steep Point may be passed 400 yards distant, and the course altered to keep along that shore 319° ; as Ja Ja Creek is opened out and the vessel now midway between the two shores, the water will be found to shoal for upward of $\frac{1}{2}$ mile, but deepen again before reaching Tullifer Creek, the least water being 13 feet at low water.

After passing Tullifer Creek the right bank should be followed at a distance of 100 to 200 yards, there being deep water near the bushes on this side; the conspicuous red earth cliffs on the eastern bank above Miller's Factory should not be shut in by Egwanga Point. When Blind Creek (not very apparent until nearly abreast of it) is abeam 200 yards distant, alter course diagonally across the river, keeping

the first group of houses situated northward of commissioner's house bearing 69° ; the water will be found to shoal as Egwanga Flat is crossed, the least depth—12 feet at low water—deepening again as the African Association Factory opens off Egwanga Point, bearing 32° , when alter course to the northward, anchoring as convenient in 4 fathoms abreast the Government pier, about 300 yards distant. There is sufficient room for a vessel to lie at single anchor.

Coast.—Between Opobo River and Kwoibo River, 24 miles to the eastward, the coast is formed by a narrow ridge of sand, a few feet above sea level, and in some places only a few yards broad. This ridge is bordered inland by a continuous series of swamps, lagoons, and mangrove creeks.

At $2\frac{1}{2}$ miles eastward of Opobo River is situated the entrance to Shooters Creek, which is about 50 yards broad.

False Kwoibo (Quaibo) River is situated 2 miles eastward of Shooters Creek; the entrance is nearly 1 mile wide, with an island on the western side and breakers extending right across the channel. Between False Kwoibo and Kwoibo Rivers are situated five small openings which probably change their positions at different seasons.

Kwoibo (Quaibo) River.—The entrance to this river is about $\frac{1}{2}$ mile wide between two well-defined points, that to the eastward being marked by a white beacon.

Landmarks.—A conspicuous clump of high trees is situated $\frac{1}{2}$ mile eastward of the entrance at about $\frac{1}{2}$ mile inland, and when the entrance bears 359° the white mission chapel at Ibeno is visible from a distance of 5 miles.

Kwoibo River is navigable by vessels of about 9 feet draft for a distance of 15 miles to Eket, where there is a factory having considerable trade and a resident district commissioner. Canoes and boats can ascend about 35 miles above Eket.

Numerous lagoons are situated on each side of the river, with which they are connected by shallow creeks.

Bar.—The bar is a shifting bar with breakers extending about 1 mile seaward. In 1912 there was a channel across it about 200 yards wide, with a depth of 6 feet at low water springs, increasing within to a depth of 3 fathoms.

Tides.—Springs rise 6 feet.

Communication.—Two small steamers of from 8 to 9 feet draft, belonging to the African Association, ply regularly between Calabar and Eket.

Coast.—From Kwoibo River the coast trends 88° for 17 miles to the western entrance point of Calabar River and is formed by a strip of sand backed by dense forest; the surf is not so heavy on this coast

as on that westward of Opobo River, and in the dry season landing can be easily effected in ordinary boats.

Mimbo village is situated 11 miles eastward of the Kwoibo.

Creeks.—The creeks and lagoons which afford uninterrupted internal communication between Porto Novo and Kwoibo River do not extend eastward of that river.

Old Calabar River (known as the Calabar and Oione by the natives) has its entrance between Tom Shot Point on the west and East Point on the east, the latter bearing 115° , distant 11 miles from the former.

Into this estuary also debouch the Akwayafe, Akwa, and Cross Rivers, which, with the Old Calabar and Ndian Rivers, drain a large tract of country to the northward of the Kameruns and other mountain ranges.

Old Calabar River unites below Seven-Fathoms Point with Cross River, a large and important waterway some 400 to 500 miles in length.

There are several large towns on the Old Calabar River above Duketown, and a considerable trade in produce is carried on by means of canoes with the Cross and other adjacent rivers. The European factories at Duketown form the center for collection and distribution; a system of barter being adopted, brass rods, manilas, and cloth, in great measure, still taking the place of coin.

Old Calabar contributes a larger share of the trade than any of the other settlements on the Oil Rivers of Southern Nigeria.

Old Calabar (Calabar or Duketown) on the eastern bank of the river, 25 miles above Tom Shot Point, is situated on the first rising ground met with, about 5 miles northeastward of Alligator Island. The river here is contracted to 700 yards in breadth opposite Queens Beach.

Government Hill, situated near the northern end of the town, fronting Queens Beach, is occupied by the Government offices and establishments, and being well laid out with botanical and fruit gardens, presents a pleasing appearance.

Calabar is the headquarters of the Eastern Province of Southern Nigeria, and the residence of the provincial commissioner and a large staff of Government officials.

An extensive tract of land has been cleared and numerous buildings erected, among which are the barracks of the West African frontier force on a hill 3 miles inland, several churches, chapels, and schools, a prison, hospital, and two banks.

There is a quay wall along the river front.

There are nine European factories, which occupy a water frontage throughout the extent of the settlement, a distance of nearly 2 miles.

The native town, also known as Duketown, of considerable extent, with some good houses belonging to the principal chiefs, and some school buildings, lies in a hollow fronting the river between Government Hill and Mission Hill, to the southward of which latter is the site of the Presbyterian mission; beyond this is Henshaw Town, still farther to the southward.

Communication.—The steamers of Elder Dempster Co. call from Liverpool, via Canary Islands and West African ports. The German Woermann Line also call frequently.

A canal is being constructed between Calabar River and Kwoibo River, which, when completed, will afford communication by vessels of 4 feet draft, between Calabar and Lagos via Opobo, Bonny, Brass, Akassa, and Forcados.

A weekly mail service by motor boats is maintained by Government to Ossidinge on the Cross River, 243 miles above Calabar.

Calabar is connected with the various telegraph systems by overland wires to Bonny and Lagos.

Coal.—The Government stock is from 400 to 600 tons, and the annual importation 2,000 tons; lighters are available. The coaling wharf is 142 feet long, with a depth of 19 feet alongside.

Fresh vegetables and bread are easily procurable, but meat is somewhat scarce.

Good fresh water can be procured in any quantity from a hydrant on the coaling wharf.

Repairs.—Small repairs can be undertaken at the Government dockyard, at Queen's Beach, which has a slipway and machine shops.

Hospitals.—There is a Government hospital, 9 beds for Europeans with a full equipment and doctors and nurses, on Government Hill; there are also hospitals for natives and for contagious diseases.

Climate.—The climate is generally unhealthful for Europeans, but the Old Calabar River generally is singularly free from mosquitoes; the temperature ranges from 95° to 65° F., there being no very marked distinction between the dry and rainy seasons.

Pilots.—No pilots are obtainable for this or any of the Niger entrances.

West Point.—The beacon on this point is 45 feet in height, and easily distinguished; when seen from the westward West Point appears as a low, sandy point with the steep bluff of Tom Shot Point behind it.

Western shore to Duke town.—The coast line from West Point, as far northward as James town, is sandy, low, and backed by high bushes and forest trees. On West Point is a white tripod beacon 30 feet high, surmounted by a barrel, but not easily distinguished.

Between Child Point and Tom Shot Point there is a large opening, the outlet of two creeks that can only be reached by boat; near the

northern creek is the small village of Efiat; this creek is believed to connect with Douglas Creek, thus making an island, the southeastern extreme of which is Tom Shot Point.

Camp Point, very low and covered with small bushes, forms the northern extremity of the peninsula extending northward from Tom Shot Point; the coast line in the vicinity of the latter point appears liable to alteration in shape.

James town is a fishing village about 5 miles northward from Tom Shot Point; the red earth cliffs, about 30 feet high, $\frac{1}{2}$ mile south-eastward of it, serve to point it out; also the two-storied pagoda-shaped house of the native chief, which is somewhat conspicuous. There is a mission station here. Only a few supplies can be obtained.

Oron village.—Northward from James town the coast line consists of low mangroves and swamps, fronted by drying mud banks with small creeks. Herald Point, 6 miles distant, may be distinguished by low bushes of a light green color. At the village of Oron, $6\frac{1}{2}$ miles farther on, where hard ground is again found, there is a Government station and post and telegraph office.

Parrot Island, situated on the western side of the channel to Duke town and 12 miles below it, is oval in shape, with high mangroves; its extremes appear sharp when viewed from any direction; here the river contracts considerably in breadth.

A white tripod beacon stands on the western side of Parrot Island.

Tobacco Head, 3 miles northward of Montanaro Point (Parrot Island), is difficult to distinguish until nearing Parrot Island, the opening between it and Alligator Island not being very apparent.

Alligator Island is on the western side of the channel, 5 miles below Duke town and opposite Seven Fathoms Point.

When southeastward of Parrot Island, care must be taken not to mistake this island for Tobacco Head; a bearing of the eastern point of Parrot Island will prevent any mistake.

Moor Island is a small mangrove islet close off the southeastern end of Alligator Island, from which it is difficult to distinguish it, being separated from the latter only by a narrow boat channel nearly dry at low water.

The entrance to the Cross River is northward of Alligator Island.

The Old Calabar River here changes its direction sharply to the northeastward in a straight reach to Duke town, and has no distinguishing feature on either side.

There are two beacons which serve to point out the Calabar Crossing midway up this reach.

The river is reported to be navigable, with a depth of not less than 15 feet, for 15 miles higher up, but vessels seldom ascend above Duke town, as there are no factories above this, and all produce

reaches Duke town by canoe. Two miles northward of Duke town, and on the same side of the river, is situated Old town, also standing on high and well-wooded ground.

Two miles above Old town is a creek on the western side of the river which leads to Creek town, where there is a mission station.

Twenty miles above Duke town the width of the river is only 20 or 30 yards, and the depth about 6 feet.

Eastern shore—Bakasi Head is the eastern entrance point, and immediately eastward of it is Bakasi Gap, forming a very conspicuous break in the coast line, and serving to point out the entrance to the river, especially when coming from the eastward.

The opening is about $\frac{3}{4}$ mile wide and is the entrance to a creek which communicates with Bakasi River.

East Point, about 2 miles from Bakasi Head, consists of high mangroves.

From here the coast line is sandy, backed by high mangroves, and trends northward for 3 miles to Sandy Point, a low sandspit with bushes. Just eastward of this point is the small fishing village of Ifiari.

Bakasi Clump is a round clump of trees, 150 feet high, near Sandy Point, which, being higher than its surroundings, is somewhat conspicuous and forms a useful mark.

From Sandy Point the coast trends eastward, forming Akwabana Creek.

Akwa Point, nearly 12 miles 330° from Sandy Point, is formed of tall mangroves and shows as a well-defined point when viewed from the northward; between these points are the entrances to the Akwabana Creek, Akwayafe, and Little Akwa Rivers; this shore is difficult to make out from the distance of the navigable channel, and is fronted by extensive mud flats and shallow water.

Green Patch Point, $1\frac{1}{2}$ miles 326° from Akwa Point, forms the southern, and Moore Point, low and rounded, the northern entrance point to Great Akwa River.

Fish Point, opposite the southern end of Parrot Island, is easily recognized, and appears as a sharp point from the northward.

Between Fish Point and Base Point the coast recedes, forming a bight, at the head of which is a creek which connects with Old Calabar Reach.

Southward from James Island, between it and Smoke Point, is an opening known as Smoke Crossing, which leads northward through Escape Channel, a narrow deep creek on the eastern side of the island.

From near Elliott Point, the northern extremity of James Island, the coast line continues nearly straight to Seven Fathoms Point,

after rounding which it is again nearly straight as far as the settlement at Duketown, with a few small creeks between.

Tom Shot Bank.—This extensive bank on the western side of approach occupies a space which, as defined by the 3-fathom line, is situated between a line drawn in a southerly direction for $4\frac{1}{2}$ miles from West Point Beacon, then in a southeasterly direction for 6 miles, when it trends to Outer Reef, and thence in a more westerly direction to Jones Crossing Buoy, the northern limit being defined by the southern side of Tom Shot Channel.

Within these limits the depths are irregular, and vessels approaching should not come within the 4-fathom line until Outer Reef bears 21° .

Outer Reef.—This reef, the outer part of which is situated $\frac{3}{4}$ mile southeastward of West Point, is always marked by breakers even in the calmest weather; it is steep-to on the eastern side, and may be approached with safety. The breakers on this reef form a valuable mark of recognition, and in misty weather are the first distinguishable feature.

Bakasi Bank, on the eastern side of the entrance, is a bank of soft mud of considerable area, extending offshore westward and southward from Bakasi Head, with depths of from 1 to 3 fathoms over it. The southwestern extremity near the 3-fathom curve lies with East Point bearing 24° , distant 10 miles, whence it trends to the eastward.

Fishing stakes are placed all over the bank and will be found near its western edge in a depth of more than 3 fathoms. There are no stakes on Tom Shot Bank, a fact which it is well to remember when the land is not visible, as this will be a guide as to which side of the entrance a vessel may be.

A full description of the various banks to the northward of these two banks, which render the navigable portion of the river very prescribed, would serve no useful purpose, and they can readily be seen on referring to the chart.

Buoys.—Fairway Buoy is a red bellbuoy, surmounted by staff and cage, situated with West Point Beacon bearing 336° , distant 14 miles.

No. 1 buoy, known as "Tom Shot Buoy," is a black can buoy surmounted by staff and cage, moored in a depth of 23 feet, with Tom Shot Point bearing 257° , distant $3\frac{1}{2}$ miles.

Ikang Buoy is a red conical buoy surmounted by staff and cage, moored in 3 fathoms, in the entrance to Akwayafe River, with Parry Point bearing 94° , distant 4.3 miles.

Peacock Crossing Buoy is a red conical buoy surmounted by a staff and cage, moored in a position from which Tom Shot Point bears 235° , distant 5 miles.

No. 2 buoy is known as "Kwa," and is a red conical buoy surmounted by staff and cage, situated in a depth of 20 feet off the entrance to Little Akwa River, with Green Patch Point bearing 344° , distant 4.2 miles.

No. 3, known as "Green Patch" Buoy, is a black can buoy surmounted by staff and cage, moored in a depth of 19 feet, with Green Patch Point bearing 80° , distant 1.7 miles.

The following three buoys mark Tom Shot Channel:

Elbow Bank Buoy, a red conical buoy, moored in Tom Shot Channel, 57° , distant 1 mile from West Point Beacon.

Middle Buoy, a red conical buoy, surmounted by staff and cage, moored in Tom Shot Channel, 66° , distant $2\frac{1}{2}$ miles from West Point Beacon.

Jones Crossing Buoy, a red conical buoy, surmounted by staff and cage, moored in a position bearing 85° , distant 2,050 yards from Tom Shot Point.

A black drum buoy has been moored in a depth of 10 feet on Oron Crossing.

A red can buoy has been established on Growler Crossing in a depth of 20 feet, with Jackdaw Point bearing 201° , distant $2\frac{3}{4}$ miles.

Beacons.—West Point is marked by a white tripod beacon, Parrot Island is marked on the western side by a beacon, and Calabar Crossing is marked by a white diamond-shaped beacon on each side of the river.

Directions.—The following general directions are given as a guide in navigating the river, which, it must be borne in mind, is at times attended with difficulty; the coast being very low, with but few distinguishing features, renders fixing in the broader parts of the river very difficult. The tidal streams are strong and the buoys can not be depended upon.

The best channel is indicated on the chart, and the shoalest water therein is 14 feet at low water springs. The spring rise varies from $7\frac{1}{2}$ feet at the entrance (Tom Shot Point) to 10 feet at Duke town, which vessels drawing 20 feet have reached.

During the harmattan season, December to March, inclusive, the river is at times enveloped in a dense haze, lasting a week or more, when it frequently happens that a vessel having made out the approach by the lead, with possibly the assistance of the Fairway Bellbuoy or the breakers on the Outer Reef, will not sight the land until Parrot Island is seen. Also in the rainy season, May to October, the rivers are often obscured by thick weather from seaward.

The Fairway Channel, between Tom Shot Bank and Bakasi Bank, is about 5 miles wide on the parallel of the Fairway Bellbuoy, contracting to half that distance abreast of the Outer Reef, and has a depth of not less than 18 feet.

Approach from westward.—In approaching Old Calabar River from the westward great care must be taken to avoid Tom Shot Bank, the southwestern limit of which is at present not fully determined. Should a vessel that is not sure of her position find hard bottom, it would be prudent to haul to the southeastward and endeavor to make the land about Bakasi Gap, when a bearing of East Point, if it can be seen, will assist in determining her position. The lofty mountain peaks eastward of Kamerun and Fernando Po can seldom be seen except after rains, but if visible these, with Mount Hewitt (60 miles to the northeastward), which appears from this locality as a symmetrical cone, are a good guide.

When making Bakasi Gap from the westward, do not bring it to bear eastward of 56° , which will lead southward of Tom Shot Bank and about 1 mile northward of the Fairway Bellbuoy (if in position). Should a tornado threaten, it would be prudent to anchor until it is past; they usually come from the southeastward, but sometimes from the northeastward.

From Bonny River to Old Calabar River.—When well clear of Bonny Bar steer 94° for about 48 miles until the trees on shore have nearly sunk below the horizon, or until a depth of 15 or 16 fathoms is reached; then steer 77° , when the water, after increasing to a depth of from 20 to 21 fathoms, will gradually shoal, with a bottom of black sand and mud.

As Old Calabar River is approached the bottom becomes hard with bright sand until eastward of Tom Shot Bank, when the bottom is soft mud.

Caution.—Care must be taken not to approach Tom Shot Point, or the western shore of the inner entrance, nearer than just to sight the trees upon it from a height of 24 to 26 feet above the sea, and should the water shoal to $6\frac{1}{2}$ fathoms on hard ground, stand out until it deepens to 8 fathoms. By no means come into a less depth than $6\frac{1}{2}$ fathoms over any description of bottom whatever, until East Point bears 32° or Bakasi Gap 43° ; the vessel may then stand toward East Point.

A good lookout should be kept for the breakers on Outer Reef when unable to distinguish the land; the reef breaks at all times and the breakers may be seen for a considerable distance, and when made out will at once indicate the vessel's position.

Approach from the eastward.—Great care and attention to the lead is required to avoid Bakasi Bank before turning to the northward.

Navigable depths.—The best time for entering the river, if intending to reach Duke town, is about 3 hours before high water at that place, which is $1\frac{1}{4}$ hours later than at Tom Shot Point; the distance from Fairway Bellbuoy by the main ship channel is 41 miles.

The first shallow flat to be crossed is the Akwa Crossing, 24 miles within the entrance, with a greatest depth of 15 feet at low water, bottom soft mud; then the James Crossing with 15 feet; and lastly the Duke Town Crossing with only 14 feet.

Tides and tidal streams.—

| | High water, full and change. | Springs rise. | Neaps rise. | Neaps range. |
|-----------------------|---------------------------------|---------------|--------------|--------------|
| | <i>h. m.</i> | <i>Feet.</i> | <i>Feet.</i> | <i>Feet.</i> |
| Tom Shot Point..... | 5 25 | 7½ | 5½ | 4½ |
| Parrot Island..... | 6 15 | 9 | 6½ | 3½ |
| Alligator Island..... | 6 30 | 8½ | 7 | 7 |
| Duketown..... | 6 40 | 10 | 8 | 6 |

During the dry season—December to April—the flood throughout the river as far as Duke Town begins 4½ hours before high water and runs for 5 hours, attaining its greatest velocity 2¾ hours before high water.

The ebb stream begins 1½ hours after high water and runs 5¾ hours, attaining its greatest velocity 4¼ hours after high water.

At high water the stream is slack for one hour; at low water the slack lasts three-fourths of an hour.

At springs the maximum velocity of the ebb stream during the dry season is from 2 to 2½ knots; at the Fairway Bellbuoy it is under 2 knots. The rate of the flood stream is slightly less.

At Parrot Island the ebb was found to attain 3½ knots at springs.

To enter.—Vessels having made sure of their position off the entrance, by bearings or by sighting the Fairway Bellbuoy, which may be passed within 1 mile on either side, should steer between 353° and 10° for about 7 miles, according to their position, in order to pass 1 mile eastward of the Outer Reef, which is steep-to on that side, and on which the breakers will soon be visible; allowance should be made for the tidal streams which set obliquely across the Tom Shot Bank. The bottom of this bank is generally of a harder nature than that on the eastern side of the entrance, which is all of soft mud and has many fishing stakes on it.

As the Outer Reef is approached, the land about Tom Shot Point will come into sight, and Bakasi Clump, a useful mark near Sandy Point on the eastern side, should be looked for.

When abreast of the Outer Reef, and about 1 mile distant, a course 359° for 7 miles will lead close to No. 1 buoy; the ebb stream if running will meet the vessel on the starboard bow, and allowance should be made accordingly. Thence shape course 18° for Peacock Crossing, leaving Cleave Flat on the starboard hand.

Care must be taken to avoid the East Fork Spit on the port hand, with from 16 to 18 feet of water on it, and when Green Patch Point

bears 348° and the red cliffs near James Town Village 270° a vessel will be well clear of the spit, and Green Patch Point should be steered for on that bearing; No. 2 buoy, if in position, should then be slightly on the starboard bow.

Akwayafe Flat, at Rich Corner, is steep-to, and the lead gives but little warning. Green Patch Point will be easily recognized beyond Akwa Point, though the light green-colored bushes are not very apparent until abreast of them; this point should not on any account be brought to bear to the westward of 342° .

When nearing Rich Corner care is necessary, the navigable channel there being only 1 mile in breadth, and fixing the ship's position somewhat difficult; it would therefore be well to regulate the speed accordingly, if at all uncertain about the position, or if the weather be hazy, as the tidal streams run over 2 knots at springs.

Continuing 348° for $1\frac{1}{2}$ miles farther, alter course to 332° when the red cliffs bear 255° , passing 800 yards westward of No. 2 buoy; Parrot Island and No. 3 buoy will shortly be made out nearly ahead, and as Akwa Point is neared, the fixing becomes easy.

Akwa Crossing.—When nearing No. 3 buoy at the southern end of Akwa Crossing, and which may be passed on its eastern side at a distance of 300 yards, Tobacco Head, at first difficult to make out, will be seen open to the eastward of Parrot Island bearing 320° , when steer for it.

This mark leads over Akwa Flat in not less than 15 feet at low water, soft, muddy bottom. A vessel should continue on this course, passing close along the eastern shore of Parrot Island, which has deep water close up to the trees on this side, and when its northern extreme (Montanaro Point) is in line with Heneker Point bearing 246° , alter course to 348° , passing 400 yards westward from Reyne Point and close along the western shore of James Island.

James Crossing.—When abreast of Ground Point, which has deep water close up to it, steer to bring Woodroffe Point, the eastern extremity of Parrot Island, in line with Reyne Point, the western extreme of James Island bearing 156° , and continue with these points in line astern, with Woodroffe Point just hidden, which will lead over James Flat in not less than 15 feet at low water, soft, muddy bottom.

The extremity of Parrot Island should no no account be kept open, the crossing being a narrow one with shoal water close-to on the western side.

As the flat is crossed and the water deepens on opening Escape Channel, the eastern shore of the river should be followed at a distance of about 300 yards.

Caution.—When nearing Seven Fathoms Point, speed should be reduced and the siren or whistle sounded to warn any vessels ap-

proaching from the opposite direction. The neglect of this precaution has been the cause of mishap when rounding the point in this narrow channel, where the tidal streams run over 2 knots at springs.

Seven Fathoms Point is steep-to, and may be approached closely.

Caution Bank, occupying the center of the southern end of the Old Calabar Reach, renders the navigable channel on either side of it very narrow, and its extremity, within the 3-fathom curve, reaches nearly as far south as Seven Fathoms Point, being only 22½ yards from the shore on that side.

The main ship channel lies eastward of this bank, closely following the eastern shore.

Calabar Crossing.—The beacon on the western shore (a white board on a projecting tree stump 1½ miles northeastward of Flag Point) will be seen after rounding Seven Fathoms Point. The beacon on the eastern shore (a tripod with white diamond) stands back a short distance from the shore in a small clearing of the mangrove bushes, and is hidden when approaching from the southward until nearly abreast of it.

When the latter beacon is abeam, about 150 yards distant, alter course to 2° for the beacon on the opposite shore, which will lead between Caution Bank and the Middle Ground, in not less than 19 feet at low water, springs. Allowance should be made for the tidal stream when crossing.

The western shore should now be followed for nearly 3 miles to Duke town.

Duke Town Crossing.—A vessel should not cross over to the Duke town side until abreast of Prospect Factory on the western shore, which is opposite Queen's Beach and may be known by the pier extending from it, and the bush clearing on the river bank on the same side 400 yards to the southwestward, where there is another factory.

The least water on this crossing is 14 feet at low water, springs.

Anchorage.—Should the flood be making and several of the berths be already occupied, all but small or very handy vessels should swing to an anchor off the Palm Factory or where convenient and then pick up a berth as desirable.

Naval vessels usually anchor northward of the Government yacht's moorings nearly abreast of Dawstone Factory. It is not usual to moor, except in a long vessel, the holding ground being good and the anchorage, to a great extent, protected from tornadoes by the high land to the eastward. The mail steamers lie southward of the yacht's moorings, abreast of the high cliffs.

Should the ebb be making, a vessel may steer across the river before getting abreast of Prospect Factory, allowing for the rise of the tide, which is 10 feet at springs, and no crossing should be at-

tempted at low water springs until the flagstaff on the edge of the cliff by the judicial mess house, which flies the British union jack, bears southward of 128° , in order to avoid the northern extremity of the Middle Ground, which has only 11 feet of water over it at low water springs, the bottom being stiff mud and sand.

To avoid the telegraph cable vessels should anchor below a line joining the beacon on high ground immediately above Hope Factory and that on the opposite bank immediately below Duke Town Point.

Channel west of Caution Bank.—The channel on the western side of the river above Seven Fathoms Point, between Caution Bank and Cross Point, offers no advantages and is seldom used.

This channel will be found easier to navigate when coming from the northward, if wishing to avoid the sharp turn at Seven Fathoms Point by the more frequented channel.

Directions for leaving the river are generally the same, but in the reverse order to those given for entering.

The best time for leaving Duke town in a deep draft vessel is not later than about one hour before high water, so as to insure crossing the Akwa Flat, 16 miles distant, with a sufficient margin.

If No. 1 buoy has not been clearly made out before dark, it would be prudent to anchor; or if anxious to quit the river, it is better to keep to the eastward, shoaling the water on Bakasi Bank, which is of soft mud, especially if the ebb stream is making, as the Outer Reef is steep-to and this stream sets across Tom Shot Bank.

Leaving under sail.—When descending the Old Calabar River from Duke town, the same track should be pursued as that previously described, as nearly as circumstances will permit; if the wind be contrary, which may be expected, the sea breeze generally setting in by 11 a. m., the ebb stream is strong enough for backing and filling, keeping an anchor in readiness when the channel is narrow.

Subsidiary channels.—There are other channels leading up the river, whereby a saving in distance is effected, but they are only used by small vessels and those with local knowledge.

Tom Shot Crossing, also known as Ivy Channel, used by vessels bound to and from the westward, thus saving the rounding of Tom Shot Bank, is a narrow channel between the Channel Breakers to the southward and the foul ground extending from the mainland to the northward.

This channel, which is marked by three buoys, has a depth of 18 feet at low water springs at the western entrance and 24 feet at Jones Crossing.

Directions.—Vessels approaching from the westward should, when eastward of Kwoibo River, keep in a depth of 5 fathoms at about 3 to 4 miles from the shore; as West Point is approached the

depth decreases to 4 fathoms at 3 miles from the shore, but increases to 5 fathoms when West Point Beacon bears about 37° .

Akwayafe River flows into the Old Calabar about 9 miles from the entrance of the latter. In February, 1890, the British naval vessel *Peacock*, drawing 13 feet, entered on the first of the flood and obtained 15 feet on the bar, increasing gradually to $3\frac{1}{2}$ fathoms as far as the anchorage, 8 miles above the bar. The falls of Akwayafe River are about 35 miles from the bar, and are about 30 feet high; the tidal influence is felt to within 2 miles of the falls.

This region is considered highly dangerous to white men at any season of the year on account of the exceptionally unhealthy nature of the soil and country.

Steer for this beacon when bearing 32° , passing the point at a distance of $\frac{1}{4}$ mile, and then steer for Elbow Bank Buoy; pass close southward of Middle Buoy and close northward of Jones Crossing Buoy, from which either steer for No. 1 buoy, passing between Odin Spit and St. Croix Patches, or steer 348° for Growler Crossing. Channel breakers on the southern side of Tom Shot Channel are always breaking and form a good guide. Elbow Bank and Jones Crossing Buoys are starboard hand buoys.

Tidal streams.—In the channel the tidal streams run strongly, but usually directly through.

Growler Crossing—Directions.—From Jones Crossing Buoy steer for Herald Point, passing 800 yards eastward of Seine Point and 1,200 yards eastward of Jackdaw Point; when Jackdaw Point bears 197° steer 17° for Growler Crossing Buoy, which should be passed close to the northward.

When Henniker Point is shut in by Learmonth Point steer for Smoke Point, and when Parrot Island, south extremity, bears 172° proceed in the Main Channel.

In Growler Crossing the least depth is 14 feet at low water springs.

Cross River.—This river enters the Calabar through several channels, the most important of which, known as Ikinetu Creek, is situated opposite Seven Fathom Point.

In the dry season the river is navigable by vessels of 4 to 5 feet draft for a distance of 25 miles to Itu, and in the rainy season by those of 9 to 10 feet draft.

Enyong River, an important tributary, joins Cross River on the right bank, close above Itu, and at 55 miles farther north Adamayo River joins at Afikpo on the same bank.

Above Afikpo the river trends to the northeastward for 36 miles to Obubra, at 9 miles above which it is joined on the right bank by Ewayong River, the largest of the tributaries. Above this junction Cross River trends east-southeastward for 73 miles to Obokum, on

the German Boundary, and is known to extend from 30 to 40 miles farther in the same general direction.

Rapids.—At 10 miles below Obokum, or 210 miles above Calabar, the channel is obstructed by rapids, which render navigation difficult. Vessels of light draft, not exceeding 1 foot, can in the dry season ascend to the German Boundary until the end of December, after which the rapids can only be passed by canoes until the river rises in April or May; in the wet season vessels of 4 feet draft can ascend to the boundary.

Level.—The river is lowest in March and highest in September; in some places the difference of level is 20 feet.

Tides.—In the dry season the tidal rise is experienced as far as Itu.

Buoy.—A conical red buoy, surmounted by a staff and cage, is moored in 3 fathoms at the entrance to the Akwayafe River, 4.3 miles 274° from Parry Point.

Cross River.—The main stream of the Old Calabar, which a vessel ascending to Duke town leaves at Seven Fathoms Point, continues above Tobacco Head to the northwestward under the name of Cross River.

The banks of the river above Omun (Umon) are well populated, the land is well cultivated, and large towns are numerous between Itu and Isabang. The natives of Akuna-Kuna country are reported to be cannibals.

In October, 1889, the British naval vessel *Alecto*, drawing 8½ feet of water, and having engaged a native pilot, proceeded from Duke town down to Alligator Island, keeping the right-hand bank aboard all the way, thus avoiding the numerous sharp turns in Creek Town Creek, thence through Ikinetu Creek (keeping close to the left bank) to Ikorofiong (Jericock) and for about 40 miles farther up Cross River to AkunaKuna (Ekpesim), with not less than 2½ fathoms of water, the river being a fine stream; the current was extremely rapid, averaging 5 knots, the only danger being from snags. The tide is felt as far as the mouth of Ikinetu Creek.

Depths.—The Cross River varies considerably in depth, according to the season of the year; it is navigable at all times for vessels drawing 3½ feet water as far as Ethiope Rapids, the present limit of exploration. The river is highest in September, and during the rains from the end of June to the beginning of November, rises nearly 20 feet above the dry-season limit. Thus, with a little care, such as procuring native pilots, it is navigable for double-screw steamers of considerable draft and burden.

Directions—Bakasi Gap to Rio del Rey.—After clearing Old Calabar River and having passed Bakasi Gap, a course 99° for 10 miles along the southern edge of the bank, extending 7 or 8 miles

southwestward of the peninsula of Bakasi, brings a vessel to the western entrance of an extensive, open, shallow bay 13 miles wide, into which several small streams fall, the western and largest of which, known as Rio del Rey, is from 3 to 4½ miles wide at the entrance, but rapidly decreases into a narrow channel. The left bank of the Rio del Rey forms the western boundary of the German colony of the Kameruns.

Rio del Rey—Mashantu.—About 20 miles eastward of Old Calabar River is an extensive, open, shallow bay 13 miles wide.

The shore of the bay on the eastern side slopes from the lofty Kamerun Mountains, and on the western side it is formed by the southeastern extremity of Bakasi Peninsula. The shores are thickly peopled, the inhabitants appearing to be principally employed in fishing. The native villages are large, and, unlike those further south, are built on the shores of the bay, and exposed to view from the water.

The estuary is formed by five rivers, the Mashantu or Rio de Rey, Ndian, Meta, Andonkat, and Meme.

The Mashantu.—This river is about from 3 to 4 miles wide, and can be used by steamers of moderate draft. Ten miles from the entrance it divides into two branches; the western branch leads to the settlement of Rio del Rey.

The eastern branch is known as Ofa River; this branch is connected with the Ndian, Meta, and Andonkat Rivers.

The settlement is situated on an island in the northern part of the river, about 15 miles from entrance of Rio del Rey Creek; it consists of three European trading stations—the German West African Co., the Northwest Kameruns Co., the Amba Bay Co., and a custom-house. There is no native village, and malaria is prevalent.

The Andonkat branch is obstructed by Soden Island and sand banks, over which there is a depth of 9 feet only.

The Meme River is navigable as far as Duben Falls, 31 miles from the entrance.

Depth.—The depth over the bar of Mashantu River is about 2½ fathoms, but as changes are constantly taking place this can not be relied on.

Buoyage.—A whistlebuoy, painted red, is moored in 8 fathoms 17.8 miles 303° from Debundga Point.

The red and black buoy marked B, with a ball topmark, is 4½ miles, and the black conical buoy, No. 1, 10½ miles northward of it; the above buoys mark the bar. Within the bar the channel to Rio del Rey is marked by a red and black and red buoys. The buoyage is altered to suit the channel. A pilot therefore is necessary.

Coast.—At 9 miles eastward of Rio del Rey, near to Rombi village, the line of coast turns abruptly to the southward along the foot

of the Kamerun Mountains. It is principally formed by low cliffs, hollowed in many places so as to form caverns, and at one part there are two rocky cliffs at some distance apart, connected by a gallery, perforated at equal distances by a line of apertures, resembling the work of an engineer in the excavation of a fort.

Bomba Betika Point, about 10 miles southward of Rombi village, is the termination of a ridge of hills.

Madale de Coto Point is $1\frac{1}{2}$ miles southward of Bomba Betika Point. A reef with several rocks above high water (the highest showing 4 feet) extends to the southwestward for $1\frac{1}{2}$ miles, and shallow sand banks extend for 2 or 3 miles farther to the westward of this point; Debundga Light shows red over these dangers.

Bibundi Bay, on the western side of Mount Kamerun, is 10 miles across, and formed by Madale de Coto Point, on the north, and Debundga Point on the south. The shore of the bay from Madale de Coto Point to Bibundi River, for about 3 miles to the southeastward, is black mud with mangrove bushes, and from the river to Debundga Point it is rocky.

River.—The river, which is difficult to make out from seaward, has a narrow entrance between a steep rocky bank on the southern side and a sandy spit on the north; it is always accessible for small boats, but a vessel drawing 5 feet would have to wait until half flood. Just within the entrance the river forms a small harbor of about 1 acre in extent.

Bibundi town, about 200 yards from the beach, is concealed by the trees. This place, which has three large cocoa plantations, is the center of the trade for the country to the west of the Kamerun Mountains, and for some distance northward. Southward of the mouth of the river there is a Swedish Factory, which is a white house, with a black building behind it.

Light.—From a house, with tower, 39 feet in height, on the south side of the river entrance, is exhibited a fixed white light, elevated 46 feet above high water, and visible 6 miles.

This is a private light, and can not be relied on.

Anchorage.—If entering the bay from the southward, vessels should not come nearer the shore than 1 to $1\frac{1}{2}$ miles, and into not less than $5\frac{1}{2}$ fathoms water. There is good anchorage off the factory in 6 fathoms water on a muddy bottom, at about 1,400 yards from the shore.

Also of N'Gdondoge village, in the southern part of the bay, in $9\frac{3}{4}$ fathoms water, over sand and mud bottom, with Debundga Point bearing about 209° , and the village about 800 yards.

Debundga Point is a bold headland terminating in cliffs of red limestone from 40 to 50 feet above high water.

Light.—A fixed light, with white and red sectors, elevated 262 feet above high water, is shown from a white cylindrical tower, 33 feet high, on Debundga Point. The white light is visible 15 miles and the red light 11 miles. For sectors, see chart and Light List.

Lavati Point, with a reef, which shows at low water, running off for about 100 yards, with probably sunken rocks extending beyond it, is about $2\frac{1}{2}$ miles to the southeastward of Debundga Point, and when seen from either southeast or northwestward, appears as a well-defined bluff.

Bakinki.—Anchorage can be obtained off Bakinki village, at $\frac{1}{2}$ mile from the shore, in 9 fathoms water, with a rocky and uneven bottom; Lavati Point, bearing about 299° . The village is about 1 mile inland. There is a very good landing in a small bay close to where a stream runs into the sea.

Batoki Rock is 50 feet above high water, and 30 yards offshore, to which it is joined by a reef of rocks.

Batoki—Anchorage.—Anchorage can be obtained off Batoki village at about $1\frac{1}{2}$ miles from Limboh Point, in 10 fathoms water, on a muddy bottom, with Batoki Rock bearing 49° , and Limboh Point 105° . The village can not be seen from seaward. The landing is bad, but the best place is about 50 yards westward of Batoki Rock.

Habicht Rock is a rocky shoal, with from 3 to 6 feet over it, situated with the extremity of Limboh Point bearing 88° , distant 1,600 yards.

Limboh Point is the northwestern point of Amba Bay, the 5-fathom line extends about 600 yards from it.

Mokundange Rock—Buoy.—A rock, with 6 feet of water over it, marked by a red spar buoy with ball topmark, lies with Limboh Point bearing 286° , distant 1,600 yards; this is the southern extremity of a shoal plateau which extends from the shore a distance of 1,400 yards in the bay between Limboh and Nyeme Points. The buoy should be left to starboard in approaching Mokundange Bay.

Amba (Amboise) Bay.—On the southern side of Mount Kamerun is situated Amba Bay and islands.

The northern shore of Amba Bay from Limboh Point is formed by several bights, the dividing points between which are fringed by off-lying rocks; the eastern shore is formed by a peninsula $2\frac{1}{2}$ miles long, or which there are four hills.

Amba Island (Ndami), 138 feet high, is the outer or western island in the bay; it is nearly barren, the rocky slopes and summit being only covered with a little brushwood and grass; at the southern end there are a good many lime trees and a few guavas. It is, in fact, a narrow ridge of rock, elevated at the southern extremity.

Landing place.—The only landing place at Ambas Island is difficult of access, on account of the rugged rocks and incessant swell; it lies near the north extremity of the island. There is only one scanty spring of fresh water, which is occasionally dry.

Bobia Island, known also as Pirate Island, from the supposed disposition of its natives, lies $1\frac{1}{2}$ miles northeastward from Ambas Island; it is even more barren than the other islands in this bay, and probably formerly joined the adjacent perpendicular cliff on the mainland, as the geological structure is similar, and between them there is but a narrow channel. The process of destruction of this cliff is still going on, as enormous fragments of recently fallen rocks are lying at the northern extremity of the island.

Although Bobia is much smaller than the other two islands in Ambas Bay it is densely populated, almost every available spot on its rugged surface being occupied by a hut. It is perpendicular on all sides, and the only access to the summit is by clambering up what appears to be the projection of a basaltic dike—a path available only for one person at a time. The inhabitants probably owe to their impregnable position the bad character they have among their neighbors. There is a flagstaff on the island.

These islanders are the principal fishermen of the bay, which in fine weather they cover with their light canoes.

Pirate Rocks, some of which are above water, extend $\frac{1}{2}$ mile southwestward from Bobia Island, with a depth of 7 fathoms close to their southern edge. Lucke Islet is 1,600 yards eastward of the southern extremity of Pirate Rocks.

Mondoleh Island is the largest island in the bay, and is situated in its southeastern part; it is $\frac{1}{2}$ mile long, 328 feet above high water, and rocky, but with a level surface of rich soil, composed of decomposed basalt; the steep sides of the island are covered with wood. The chart shows a beacon and a boathouse on its northern end. There are three or four springs of water halfway up the side of the island, which, though scanty, are said to flow continually. The landing is bad, but capable of improvement.

Morton Bay, in the northeastern corner of Ambas Bay, is accessible only to boats, being fronted by rocks. Limbe River discharges itself into Morton Bay.

Lights.—Two fixed red leading lights, visible a distance of 3 or 4 miles, are exhibited 300 yards westward of Government house, Victoria; the rear light is situated 45 yards 32° from the front light. These lights in line 32° lead between Ambas and Mondoleh Islands.

Anchorage is shown on the chart in $4\frac{1}{2}$ fathoms, about 500 yards northwestward of Morton Point.

The anchorage is, however, excellent in all parts of Ambas Bay, with good holding ground and depths of from 6 to 7 fathoms;

although it forms a lee shore, and there is an incessant swell, the wind is said to seldom blow home so as to endanger vessels. It is a secure anchorage all the year around.

During the tornado season—March, April, May, and October—it is advisable to anchor with the southeast Point of Mondoleh Island bearing to the westward of southwest by west, and at some distance from that island, so that it should not be under the lee during tornadoes, which blow hardest from the northeast by north.

During the rainy season, June, July, August, and September, the best anchorage is close to the northeastern end of Mondoleh Island to avoid the swell setting in from the southwestward; but during both seasons the southern point of Ambas Island should be shut in by the northern point of Mondoleh, bearing 259° .

Tides.—It is high water, full and change, in Ambas Bay at 4 h. 30 m.; springs rise $6\frac{1}{2}$ feet.

The tidal streams appear to run both ways for an equal period, the in-going stream setting to the southward and the out-going to the northward out of Ambas Bay between Ambas Island and Pirate Rocks.

Landing—Beacons.—For passing between the reefs, two diamond-shaped beacons have been erected to the southeastward of Victoria and also two beacons on the shore southward of the town, surmounted by triangular topmarks. In entering, keep the first two beacons in line until the last two are in line, then steer for them in line to the landing, which is at a stone mole where there is a depth of 5 feet alongside its outer end at low water.

A white light is shown from each of the front leading beacons on the eastern side of the bay and a red light from each of the rear beacons.

There is also landing at the West African Plantation Co.'s depot at Bota, about 1 mile westward of Limbe River, where there is a stone pier with about 10 feet alongside at high water.

A white light is shown from the end of each of the piers at Victoria.

Victoria is the seaport of Buea, the seat of Government; it has two principal streets and is surrounded by bush-covered hills, the highest being over the Botanical Gardens. The white population numbers about 30. Buea is reached from Victoria by a three hours' journey by light railway to Soppo, then two hours by road.

Supplies.—Wood and, generally, live stock may be obtained in abundance, the latter being much cheaper than at Fernando Po. Yams are plentiful and good, but other vegetables scarce.

There is a little difficulty in obtaining a regular supply of fresh beef, owing to there being no contractor at Victoria; but a whole bullock can always be purchased. There are numerous herds of

cattle, and sheep are bred in the vicinity. An artesian well has been sunk on the old Buea Road, $1\frac{1}{2}$ miles from Victoria, whence water is carried by means of an aqueduct, 3,000 yards long; connection has been made with the pier, along which pipes are to be laid.

Nearly $\frac{1}{2}$ mile to the northward of the settlement the Limbe River runs into the bay, which is convenient for washing clothes and affords a good bathing place, but for drinking the water must be boiled.

Railway.—There is a private railway from Bota, on the northern shore of the bay, to Buea.

Trade.—The chief product is cocoa; only a small business is done in palm oil, oil kernels, and ivory.

Cape Nachtigal—Light.—A group flashing white light, elevated 148 feet above high water, and visible 18 miles, is exhibited from a white framework tower on Cape Nachtigal, the southeastern point of Ambas Bay. See Light List and charts for sector and details.

Kriegsschiff Inlet.—Eastward of Cape Nachtigal the coast recedes and forms a bight about 1 mile in extent, named Kriegsschiff Inlet, at the western part of which there is a long inlet. There is a petroleum spring on the beach, and another a little way inland.

Cape Bimbia forms the southern extremity of the base of Kamerun Mountains, the land above it rising gradually and regularly from the sea.

Nicoll Island, situated $1\frac{1}{2}$ miles eastward of Cape Bimbia, lies $\frac{1}{2}$ mile from the shore, on the western side of the mouth of Bimbia River. The island is 240 feet above high water, thickly wooded, and has a shoal bank extending from the northeastern side, and shoal patches between it and the shore; the north and south extremities are moderately high, with a low plain between them.

Anchorage.—Between the western side of the island and the mainland, near King William town, is an anchorage where small vessels may find shelter in depths of $2\frac{1}{4}$ to $2\frac{3}{4}$ fathoms; a watering place is situated about $\frac{3}{4}$ mile to the northward of the town.

Bimbia River, the entrance to which lies about $1\frac{1}{2}$ miles north-eastward of Nicoll Island, is about $\frac{3}{4}$ mile wide at its mouth; after passing Mowe Lake under the name of Mungo River, it winds around the foot of Kamerun Mountain, and then pursues a northerly course; it is connected with Kamerun River by Matumal and other creeks; the channel is obstructed by a bar.

The magnificent amphitheater which forms the eastern side of Mount Kamerun is crowned with numerous villages, the inhabitants of which mostly pursue the palm-oil trade.

Bar.—The least depth on the bar of Bimbia River is 10 feet, and, at a distance of 3 miles inside, the water deepens to 8 fathoms.

Anchorage.—The anchorage, in about 4 fathoms water, is $1\frac{1}{2}$ miles above Nicoll Island and off Dikullu Bay; it is said to be perfectly safe, but the heat is very oppressive.

Tides.—It is high water, full and change, in Bimbia River at 5 h.; springs rise 6 feet.

Factories.—When entering the river the first factories seen are the Bamba Plantation, three large white buildings, with white roofs, situated about $\frac{1}{2}$ mile eastward of Money village; and afterwards the British factory, a small white house with gray metal roof, near the shore at Money village, will open out.

Coast.—From Bimbia River to Cape Kamerun, the distance is 14 miles in a southeasterly direction; the shore is convex toward the sea, low, and covered with mangroves, being visible in clear weather from a distance of about 12 miles. Bimbia Flats which fringe the shore extend seaward a distance of 5 miles.

Cape Kamerun appears to be low but a well-defined point.

Kamerun River.—The entrance to this river is an estuary into which the streams Mungo, Wuri, Abo, and Dibamba, or Lungasi, discharge their waters; that branch which comes from northeast by east (the native name of which above Belltown is Duala or Maliba appears to be the most considerable.

The Mungo River is navigable for small steamers at all seasons by the western arm as far as Bunyu Keme, a large native town; in the rains Mondame can be reached by boats.

The Wuri branch of the Kamerun River is navigable to Yabassi or Jabassi for a distance of 40 miles from the sea, but in the dry season only as far as Bomano Creek; at 12 miles above Duala or Belltown and about 27 miles from the sea the river divides into several branches. On the Abo small steamers can ascend as far as Miang in the rainy season.

The Dibamba or Lungasi River is navigable for about 31 miles by boats at all seasons as far as the small native town of Yapoma and by canoe as far as Dibamba.

Two other rivers, Donga and the Kwakwa, enter the estuary from the eastward, and Malimba Creek joins it immediately northward of Suellaba Point, the eastern entrance point.

The Kwakwa River, which connects the Kamerun Estuary with Sannaga River, can be navigated by small steamers.

Outer anchorage.—If obliged, a vessel can anchor off the Kamerun River, out of the strength of the tide, and ride easily in a depth of $6\frac{1}{2}$ fathoms, with Cape Kamerun bearing 37° distant 12 to 13 miles.

A vessel may anchor off this coast at all seasons of the year, but never in less than 7 fathoms, except in case of necessity, because, when in less than that depth, the swell begins to assume the character

of rollers and causes the vessel to ride very uneasily; indeed, 10 fathoms is a better depth for a sailing vessel, so that the anchor may be weighed and stowed before making sail.

Bar—Depths.—The Kamerun River may be described as having an outer and inner bar, the outer bar extending from about 4 miles eastward of Cape Kamerun to about 1 mile southward of Old Hole Point; the general depth on this bar in the channel is about $24\frac{1}{2}$ feet, with detached patches of 2 fathoms. The inner bar, now dredged to outer bar depth, is about 1 mile southwestward of Duala.

Vessels of 21 feet draft can ascend the river at high water springs to Duala. It is the intention to keep the channel dredged to $19\frac{1}{2}$ feet low water ordinary springs, upon the arrival of a new dredger (1913).

Tides.—It is high water, full and change, at Cape Kamerun at 5 h. 30 m.; springs rise $6\frac{1}{2}$ feet, neaps 5 feet; at Suellaba Point at 5 h. 20 m., and at Duala at 5 h. 43 m.; springs rise $6\frac{1}{2}$ feet, neaps 5 feet.

Tidal streams.—The strength of the tidal stream at half tide is from 2 to 3 knots an hour and must be allowed for in the navigation of the river.

After a series of heavy rains the stream at ebb runs from 7 to 8 hours, attaining a maximum rate of 2.7 knots an hour, while at the flood it runs from 4 to 5 hours, with a maximum rate of 2 knots an hour. The water mark in the rainy season is $1\frac{1}{2}$ feet higher than in the dry season.

Duala (Bell) town.—Duala is situated on elevated ground 30 feet high on the southern bank about 15 miles above Suellaba Point; it extends along the bank about $2\frac{1}{4}$ miles, having a breadth of about 540 yards. The European quarter front the river, with the native quarter in the rear. The houses are neatly built of bamboo, in wide and regular streets, which are well drained, with numerous plantain and coconut trees, and large fields of maize. The principal buildings are the old Government house, the town hall, police offices, and hospital. The eastern part of the settlement is known as Akwa town.

Population.—The native population in 1912 was estimated to be 22,000 persons.

Wharves.—The foreshore from the boat camber to Herschell's store trends in a straight line, and is artificially built. It consists of a quay 40 yards broad, supported, where it meets the river, by curved iron plates, and is called the Government Quay. Boats of 6 feet draft can come alongside this quay at high tide. Including the Government Pier, there are five piers extending into the river from the Government Quay.

The Government Pier is 210 feet long, strongly built, and rests on circular iron pillars. The head of the "T" is 222 feet in length.

There is a tide register on the western end and steps at the eastern end. The upper part of the pier is of wood, and two lines of rail are laid on it, which lead to the Government stores and workshops immediately south of the pier. On it there is a traveling hand crane capable of lifting 5 tons.

Depth.—There is 26 feet of water alongside Government Pier.

Duala Piers.—Farther along the Government Quay, to the eastward are the factories of the German West African Trading Co. (D. W. H.), C. Woermann, John Holt, and Herschell.

The four piers belonging to the above firms only extend about 120 feet into the river and are built with a view to unloading lighters. On each is a stationary hand crane capable of lifting 2 tons.

Depth.—At high water there is a depth of 12 feet at the heads of these piers.

Akwa Piers.—Farther up the river, at Akwa town, are other factories of the Basle Mission, R. and W. King, C. Woermann Co., the German West African Trading Co., and the Northwest Kameruns Co., each of which have piers 600 feet long, strongly built on wooden piles. On the end of each is a stationary 2-ton hand crane.

Light.—From the Government house flagstaff is exhibited a fixed white light, elevated 59 feet, and visible 6 miles.

Depth.—At high water there is a depth of 10 feet alongside.

Communication.—The Woermann Line connects with Hamburg. The African Steamship Co. and the British Steam Navigation Co. have an established service. The Elder Dempster and other lines also call.

Communication with the interior is kept up by a river service of small steam vessels and launches. There are also some good roads and others projected or constructing.

Telegraph.—The Kameruns are connected by cable with Bonny and thence to Europe.

The submarine telegraph cable connecting Monrovia with Kamerun River is landed at Duala, where there is a cable hut and two beacons, with green notice boards, marked "T," which are in line when bearing 55° , and indicate the direction of the shore end of the cable. Vessels must not anchor on this line.

The line of cable from Duala to the river entrance is marked by five green conical buoys, marked "Telegraph."

A submarine cable is laid from Mukuri town to Bonaberi Point, the direction being indicated by beacons and a green conical buoy. Vessels must not anchor in this vicinity.

Radio.—A radio station has been established at Duala; it is open to the public from 6 a. m. to 9 a. m., and from 7 p. m. to 10 p. m., local mean time.

The call letters are K. B. U.

Coal and supplies.—There is a coal store at Duala, but the supply is uncertain. Supplies are scarce; the town is supplied from wells, all of which can not be depended on. The water in the rivers is very bad.

Floating dock.—There is a floating dock, 203 feet long, 57 feet wide, which can take vessels of 1,200 tons; it is fitted with a 17-ton crane and all modern appliances; it belongs to the Woermann Co. There is also a patent slip capable of lifting 800 tons.

Repairs.—Small repairs to machinery can be executed at the Government factory.

Quarantine.—Vessels are required to hoist the quarantine flag until pratique is granted.

Hospitals.—There is a hospital for Europeans, and also one for natives.

Pilots.—Native pilots can be obtained at Old Hole Point, about 2 miles farther on.

Trade.—The chief native industries are basketwork, making mats, and fishing.

The trade is principally in ivory, palm oil, oil kernels, ebony, rubber, and to a very small extent, cocoa.

The principal exports are palm oil and kernels, india-rubber, ivory, timber, and sugar; the imports, cotton and silk goods, powder, spirits, rice, and salt.

Mokushu Bay is a deep bight 4 mile across at its entrance, formed by the coast receding immediately northward of Cape Kamerun. At the head of this bight is situated Mikanye Creek, the principal entrance to Matumal Creek, which communicates with Bimbria River, and is said to be navigable for vessels of 13 feet draft. Victoria and Tende Creeks, the entrances to which are on the west side of the bay, are both small, but also communicate with Matumal Creek.

Mianyu (Green Patch Point), lying northeastward, distant 4.4 miles from Cape Kamerun, is a round point covered with green bushes and sloping from the west side of the river.

Modeaka Bay.—Eastward of Mianyu is the entrance to Modeaka Bay, which communicates with Bimbria River.

Mukalatanda (Rugged Point), on which are some trees having a very irregular outline, is the eastern point of entrance to Modeaka Bay.

The coast trends from Mukalatanda in a northeast by north direction for $7\frac{1}{2}$ miles to Bonaberi Point; at $2\frac{1}{2}$ and 5 miles, respectively, are the entrances to Bwape and Mungo Creeks.

Old Hole Point is on the western side of the entrance to Bwape Creek, and a bank which fronts the shore off this point has extended; there is a depth of 1 foot on its outer edge, at 1,200 yards south-

southeastward of the point. Mukalatanda Point, kept to the northward of the bearing 261° leads southward of the bank.

Mungo Creek, navigable for canoes only, enters the Kamerun Estuary, about $2\frac{1}{2}$ miles westward of Bonaberi Point.

Suellaba Point, the southern entrance point of the Kamerun River, bears 114° , distant 4.4 miles from Cape Kamerun; it is a singularly long, low, and narrow point; the beacons on it have been successively washed away and the trees on the northern part of it have been overthrown, but the trunks remain; the point is gradually being eroded by the sea. A shoal with detached patches extends northwestward for a distance of $1\frac{1}{2}$ miles from the point.

Landmarks.—A sanatorium, 1 mile southward of the point, is conspicuous from the sea. There is also a conspicuous tree 9 miles southeastward of the point.

Malimba Point bears 53° , distant 9 miles, from Suellaba Point; between these points the coast forms an extensive shoal bay which receives the waters of Malimba Creek and of Kwakwa, Donga, and Lungasi Rivers. At the mouth of Malimba Creek, southeastward of Suellaba Point, are situated several wooded islets.

From Malimba Point the land trends northwest by north for $1\frac{1}{2}$ miles to Olga Point, and then northeastward for $6\frac{1}{2}$ miles to Duala, the most extensive opening between them being Prisu a Loba (Doctor) Creek, situated $4\frac{1}{2}$ miles northeastward of Malimba Point.

Channel.—The navigable entrance to the Kamerun River, between Cape Kamerun and Suellaba Point, is narrowed to a width of about $1\frac{1}{2}$ miles by extensive shoals, which extend from the shore on either side. Off Cape Kamerun a depth of about 3 fathoms is found at a distance of $1\frac{1}{2}$ miles from the shore, the depth then quickly increasing to 8 and 10 fathoms; great caution is therefore requisite on approaching this side of the channel, as the lead gives but little warning.

The southern side of the channel is deeper than the northern, depths of from 10 to 12 fathoms being found at 1 mile northward of Suellaba Point; the banks on this side, also, are steep-to.

Hundskopfe (Dog's Head) Shoals.—These shoals, which are on the eastern side of the channel, are irregular in form, and their northeastern point is distant 2 miles in a west by north direction from Suellaba Point; they then extend in a southwest and southerly direction for a distance of $4\frac{1}{2}$ miles; their general width is nearly 2 miles. They almost always break heavily, and can be seen from a long distance, but are very dangerous to vessels caught in the entrance by the ebb tide, which rushes with great velocity over them, especially at spring tides.

Hundskopfe Shoals are steep-to; on their northwestern side, at $\frac{1}{2}$ mile from them, will be found depths of from 10 to 12 fathoms;

care should therefore be taken not to approach them too closely, on account of the sudden decrease in the soundings.

Beacon and buoys.—The following beacon and buoys were in existence according to the latest information, but, as both are liable to be washed away, no dependence should be placed on finding them in position. They are shifted as the channels change.

Beacon.—Yoss Beacon, standing on Yoss Point, was the only beacon existing in 1912.

Buoys.—There are three provisional red nun buoys marking the entrance to the Kamerun River.

The eastern side of the channel to Duala is marked by red buoys lettered from A to G; these are cans with the exception of F and G, which are spars. The western side is marked by black conical buoys, numbered from 1 to 9, with the exception of 5, which has been discontinued. A quarantine buoy is moored in the southeastern part of the roadstead off Suellaba Point.

The only two mooring buoys off Duala are for the use of the mail steamer.

Dredged channel.—A channel has been dredged across the bar in the approach to Duala, the axis of which bears 63° . Vessels of any draft that can get up the river can proceed through this channel at any stage of water.

Directions.—Vessels coming from the westward should bring Cape Kamerun to bear 27° and pass buoys Nos. 1 and 2, leaving both on the starboard hand, buoy No. 2 being in line with Manoka and Suellaba Points. When buoy No. 2 is passed change the course to 48° and leave buoy No. 3 to starboard. When Cape Kamerun bears 0° steer 63° until it bears 315° , then steer 77° and anchor in any desired depth, taking bearings on Suellaba Point, the extremity of which is rendered conspicuous by large bare trees which surmount it.

The channel off Duala is about 300 yards across. The bottom in the channels of the river is very soft, and would not damage a vessel on grounding; on the bar it is hard sand and gravel.

The anchorage off Akwa town is in 4 or 5 fathoms water, over soft bottom.

CHAPTER VI.

KAMERUN RIVER TO CAPE LOPEZ.

The coast.—From Suellaba Point the coast takes a general trend of southeast-by south for a distance of 54 miles, as far as the southern end of Panavia Bight, in latitude 3° north, and thence about south by west to nearly the second parallel of latitude. Here the land falls back into a deep indentation known as Bata Bay, whence its general direction is southwestward toward Cape St. John, a distance of 54 miles.

At times a heavy surf breaks upon the whole line of coast between Kamerun River and Corisco Bay, making landing dangerous.

Southward of this cape lies the extensive bight known as Corisco Bay, which is separated from the Gabon River by the peninsula, or rather island, of Esterias, for it is believed that one of the creeks southward of the bay communicates with the inner basin of the Gabon Estuary.

Navigation.—The navigation along this extensive tract of coast may be considered safe by keeping a moderate offing, except in the vicinity of Cape St. John, where the depths are very irregular and render increased caution necessary.

Aspect.—The shore line between the Kamerun and Gabon Rivers is uniformly low and wooded and generally fringed by a sandy beach, off which, in many places, lie detached rocky patches. The large trees with which the coast is thickly covered may be seen from seaward a distance of 12 to 15 miles. The high and conspicuous Elephant Tree, in latitude $3^{\circ} 44'$ north, forms a good mark of recognition for this part of the coast; it is now said, however, to be difficult to distinguish.

Mountains.—Beyond what may be termed the seashore plain, principally at the northern part of this coast, there are in the interior mountains of a conical form apparently isolated, as also ranges more or less extended, with diversified shades according to their distance from the coast. They offer excellent points for recognition, as several of them are very lofty; thus, amongst others, the Miter, eastward of Cape St. John, attains an elevation of 3,940 feet, while the central Sharp peak of the extensive range known as the Seven Hills, situated 25 miles northward of the Miter, rises 2,786 feet above high water.

Between latitude 2° north and 3° north, the country as it recedes from the coast, rises to a series of elevated plateau, the more distant showing the highest peaks, as those of the Table and Saddle, which assume the appearance of being isolated when seen from a distance; but in Corsico Bay, the land as far as the Gabon River is less remarkable.

Sannaga River.—The Sannaga River, formerly known as the Borea, has two mouths, which, separated by Malimba Island, are about 5 miles apart. The Benge or northern mouth is situated about 15 miles southward of Suellaba Point, at the entrance to the Kamerun River; the Bungo, or southern mouth, is the principal outlet for the trade of the district. The islands and sand banks at the mouth of the river undergo continual changes. During the rainy season new mouths form through the banks, but the two chief channels remain, though with modifications. The Sannaga River is connected with the Kamerun River by the Kwakwa Creek.

Boats only can use Kwakwa Creek in the dry season, but small steamers do so at other times.

Depths.—Small steamers may ascend 50 miles to Edea at high water, though probably not without grounding, as there are several shallows in the river for 15 miles above the mouth, whence the depths to the town are 3 to 4 fathoms.

Benge mouth—Bar.—This mouth is said to be barred by a sand bank inside, with 2 feet water only, but to be generally practicable for boats.

The bar at its mouth appears to have a depth of 7 to 9 feet at low water at 1 mile off, with about 3 fathoms only at 2 miles offshore.

Beacon.—A spar beacon, surmounted by a white crosspiece, with "W & C" on it in black letters, has been erected near this mouth.

Anchorage.—There is anchorage in 2 fathoms about 150 yards from the shore, off the westernmost building of Woermann factory, at Malimba Benge, well sheltered by the south point of entrance, but the holding ground is bad.

Tide—Tidal streams.—The rise of tide is about 4 feet. During floods caused by the rains the stream always runs out of the river; with the tide falling the rate is about 4 knots an hour, being reduced by the flood tide to about 3 knots.

Bungo Mouth—Bar.—This mouth is hampered by a bar which is dangerous and on which the sea breaks heavily.

Anchorage.—The anchorage is in 3½ to 8 fathoms, good holding ground, with the German factory (at which there appears to be a flagstaff) bearing 82°. Small craft can find good shelter behind the sand bank at the entrance of the Bungo.

Town.—There are factories near the entrance on both sides of the river, and on Malimba Island, but the town of Edea is situated about 45 miles up the river.

Panavia Bight.—From the Sannaga River to Garajam Point, the southern limit of Panavia Bight, the distance is 40 miles in a general southeast by south direction; in the bay the soundings vary from 5 to 7 fathoms, mud and sand, at distances of 3 to 6 miles from the land.

Shoals.—At about 7 miles southward of Nyong, or Beundo River entrance, a tongue with $2\frac{3}{4}$ fathoms over it projects about 3 miles from the coast.

A shoal of 3 fathoms lies about 5 miles offshore in the northern approach to Lonji, with Kribi Lighthouse bearing 175° , distant $11\frac{1}{2}$ miles.

A rocky shoal, with a least depth of about $16\frac{1}{2}$ feet over it, is located in latitude $3^\circ 08'$ north, longitude $9^\circ 53'$ east.

A preliminary examination of Panavia Bight has revealed two rocky shoals; one with a least depth of 15 feet over it, 5.8 miles $307^\circ 30'$ from Longi Front Beacon, in (approximately) latitude $3^\circ 08' 11''$ north, longitude $9^\circ 53' 06''$ east; the other with a least depth of 18 feet over it, 6.2 miles $304^\circ 30'$ from the same point, in (approximately) latitude $3^\circ 08' 11''$ north, longitude $9^\circ 52' 42''$ east.

A survey of this bight is now in progress and lesser depths may be found to exist.

Anchorage may be obtained anywhere along the shore of Panavia Bight in from 5 to 6 fathoms, mud, but when water is required anchorage abreast of a river is generally advisable. The anchorage along this coast is secure, as the tornadoes blow offshore.

Nyong, or Beundo River.—The entrance to Beundo River, just within which is Little Batanga, is situated about 23 miles southward of the southern mouth of the Sannaga. Fish abound in the river.

Depths.—The depth on the bar is apparently about 8 feet at high water, but the channel is subject to much change.

Aspect.—The only guide to the location of the entrance is Mount Beundo, which is the first hill southward of the Kameruns, and bears 114° , distant $4\frac{1}{2}$ miles from the river entrance.

There are two small factories on the left bank of the river, about $1\frac{1}{2}$ miles from the bar, but these are obscured by bush. No native huts are visible.

Anchorage.—Good anchorage will be found in 4 to 5 fathoms, sand and mud, with Mount Beundo bearing about 82° .

Directions.—To cross the bar of the river, steer for the middle of a low cluster of bushes on the right bank, until the entrance is completely open; the vessel will then be inside the breakers, and can steer

for the factory. The passage is better in the dry months. Small steam vessels can proceed up as far as the falls, about 30 miles, but may touch the ground in places. It is not advisable to attempt crossing the bar without sounding it or obtaining assistance from the factories.

Aspect.—Within Beundo River the land rises in three several plateaus, distant from the shore 3, 6, and 15 miles, respectively; of these, the most distant and highest, is separated from another range to the southward (of the same elevation and lying in a similar north by east and south by westerly direction) by a gap or saddle, 3 miles in extent.

Between this last-named range and Lonji, at the head of the bight, about $6\frac{1}{2}$ miles northeastward from Garajam Point, there is another range of less elevation, 8 miles long, and lying north and south. These high lands are the northern boundaries of more mountainous ranges, which exist farther to the southward.

Lonji, situated 11 miles southward of Little Batanga, where there are German and British factories, is conspicuous from the sea. The river discharging itself into the bay near Lonji village has a cascade; it furnishes excellent water.

Beacons.—There are two beacons which in line 112° lead into the anchorage. The front beacon consists of a post with two sheet-iron plates painted red. The rear beacon is of lattice work.

Anchorage—Buoy.—Anchorage may be obtained in about 4 fathoms, mud, off the settlement; it is marked by a black conical buoy, which is moored on the range line of the entrance beacons.

Plantation Rock, which uncovers at low water, is a rock $\frac{1}{2}$ mile offshore, in front of the Plantation (Lubecke) factories. There are several other rocks to the southward which are very dangerous for small vessels and boats, but vessels anchoring in more than $4\frac{1}{2}$ fathoms water will be outside them.

Buoy—Beacons.—A white barrel buoy is moored on the seaward side of the above rock. There are two beacons on the land abreast the rock, which in line lead clear of the rock.

Garajam Point, the southern limit of Panavia Bay, is low and wooded, and having a rounded form is somewhat difficult to recognize from a distance; but on the beach are rocks, which show out distinctly against the white sand of which the beach is composed.

Rocks.—Abreast of Garajam Point, at the distance of 1 mile offshore, are two clusters of rocks, both of which break, but one only appears above water.

The coast.—From Garajam Point the coast trends south-southwestward for 41 miles to Campo Point. Inland there are many remarkable hills, one of which, Mount Elephant, 1,707 feet high, lies 12 miles southward of Garajam Point.

For a distance of 23 miles southward of Garajam Point the coast has a fine beach without mangroves, but rocks extend off in many places to the distance of $\frac{1}{2}$ mile from the shore; it is desirable, therefore, to keep a good offing of about 2 miles, or in from 12 to 14 fathoms water.

Lowry River Waterfall.—About 4 miles southward of Garajam Point the Lowry River falls into the sea over a cliff 20 or 30 feet high. The fall is at the bottom of a small bay, and is hidden by the formation of the land, from vessels approaching from the southward, until it bears about 99° . In the dry season it is probable that the fall is not discernible any distance. It should be a good watering place, for the beach is quite smooth and the anchorage off it is excellent.

Kribi, where there is a large German tobacco plantation, is situated at the mouth of the Lowry River. It may be easily recognized by a Roman Catholic chapel on the height, and the numerous factory buildings. Good roads lead from Kribi into the interior.

Light.—A flashing white light, elevated 39 feet, and visible 12 miles, is exhibited from a white cylindrical tower, 46 feet high, on the southern side of the river entrance.

Anchorage.—The Roman Catholic chapel in line with the lighthouse leads into the anchorage.

Great Batanga Roadstead is abreast a British factory about 7 miles southward of Garajam Point; there are 5 fathoms about $1\frac{1}{2}$ miles offshore. Mount Elephant kept on a 122° bearing will lead to the roadstead.

Landmarks—Waterfall.—The houses and church of Batanga form a good mark from seaward; there is also a beacon near the south extreme of the buildings. Just north of the factory is the cascade or waterfall of Eloke or Batanga River, which assists, particularly when coming from the northward, in identifying Batanga, but in the dry season it is insignificant.

Anchorage.—The best anchorage is in 6 fathoms, with the waterfall in line with the tail of Mount Elephant, bearing 122° . The German naval vessels anchor in from $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms water, gray sandy bottom, abreast of the two large German factories, about 2 miles south of the British factory.

Landing.—There is a landing place between the two German factories, and boats are generally lying there. The landing is dangerous and many lives have been lost in making the attempt.

The water in the river appears to be good.

Trade.—The coast or trading people call themselves Batanga men, in contradistinction to the Bushmen, or people of the interior, who have penetrated to the coasts at a few points, and are said to be treacherous and hostile. The articles of export from this coast are

dyewoods, wax, and ivory. The headquarters of this trade have hitherto been at the Gabon River.

Communication.—Elder, Dempster Co.'s steamers call every four weeks.

Canoes.—Batanga is celebrated for its canoes, which consist of cottonwood, or some other light timber, carefully hollowed out with a native adz. They are about the length of a man, rarely exceed 15 pounds in weight, are sometimes curved and decorated with red paint, and yet sell for \$1 each. The thinnest of cross bars connect the sides, and the owner sits on a curved-shaped bridge of wood, a few inches above the gunwale, as on a saddle, with one leg on each side and his feet in the water. Nothing can exceed the skill with which these people launch through a heavy surf which would prove fatal to ordinary ships' boats.

These canoes appear to be confined to the coast between Panavia Bight and Campo Point. The Kroomen, who are excellent canoe men in their own way, can make nothing of these tiny boats, being altogether unable to mount them, for that is the only word which describes their management.

The coast consists of a long band of densely wooded lowland, based upon a yellow line of sand, broken in places, which appear to be the mouths of small rivers. Here and there fields of a lighter green give evidence of plantations, and the clusters of brown huts prove it to be not deficient in population. Several landing places are shown on the chart.

Mount Nisus is a high, isolated, conical hill, situated at a distance of about 15 miles eastward from Batanga. Although it belongs to a more distant range than Mount Elephant, it may be easily identified from seaward.

Mount Elephant, which was ascended in 1862 for the first time by Europeans, rises to an elevation of 1,707 feet, about 9 miles south-eastward of Batanga Roadstead, whence it is clearly discernible; it is a good landmark. From the westward, at a distance, the resemblance to a recumbent elephant is striking; from the southward it makes in the form of a cone.

Les Mamelles.—The range, of which Mount Elephant forms the northern part, follows the line of coast in a south by west direction for a distance of 17 miles, at a distance of about 7 miles from it. Les Mamelles are two hills of equal elevation in this range, 8 and 10 miles distant from Mount Elephant, and derive their name from their peculiar formation.

Mount Alouette is 3,415 feet high, and may be considered the southern shoulder of the range alluded to above. When seen from a distance of 18 miles to seaward, it appears to rise with a gentle incline to its summit, whence, after making a decided undulation to

the southward, it falls with a steep descent to the lower lands which extend as far as the Campo River.

Banoko Bay is $5\frac{1}{2}$ miles across, and recedes $1\frac{1}{4}$ miles, with a sandy beach, bounded on its north and south points by rocks, on which the sea breaks heavily; in the northern part of the bay the 3-fathom curve extends over 1 mile from the shore.

It is easily recognized by Mount Elephant, which is situated in the same parallel as the head of the bay. The shores of the bay are low and wooded, but in the center is a thick clump of large trees, which from a distance makes like a dark hillock. There is a German factory here.

Banoko Point, forming the northern point of the bay, is low and well wooded, with a small bight on its north and south sides, causing the points to project about $\frac{1}{2}$ mile from the adjoining coast line. On the banks of a small stream just northward of Banoko Point are several villages, but they are not seen from seaward.

Landing.—There is always a surf in the bay, where landing should never be attempted in a ship's boat.

Tides.—It is high water, full and change, in Banoko Bay, at 5 h. 24 m., the rise being 5 feet. At the distance of 3 miles offshore the stream of tide was scarcely felt, although the high-water mark was distinctly seen on the sandy beach.

Londotongo and Bushtown are native villages on the coast, 6 and 10 miles, respectively, southward of Batanga.

Wolf Rock is a small but remarkable pyramidal rock, 30 feet high, and surmounted by a small beacon. It has the shape of a regular cone with a truncated summit, and forms an excellent mark. It lies a short distance from the shore, surrounded by rocks upon which the sea breaks violently.

Caution.—Southward of Wolf Rock vessels should keep a greater offing, as the soundings are not so regular, and the 5-fathom line gradually increases its distance from the shore to $3\frac{1}{2}$ miles abreast Weber Point. Off the coast between Gertrude and Weber Points the water is reported to have shoaled considerably.

Campo Bay.—From Saddle or Gertrude Point, the northern point of this bay, to Campo Point, the distance is about 12 miles 195° , and from this line the bay falls back 3 miles in the vicinity of the Campo River.

Gertrude Point is low, sandy, and covered with trees, and does not possess any remarkable characteristic, but it is marked by a beacon.

Campo Point, though low and wooded with a sandy beach, forms a salient feature of the coast, and is surrounded by a line of breakers 1,400 yards offshore, which should be given a wide berth.

Campo River, the native name of which is N'Tem, falls into the sea, at the head of Camp Bay, about $3\frac{1}{2}$ miles eastward of Campo Point, and may be recognized not only by the position of the point, but also by two remarkable hills, which rise from 24 to 27 miles in the interior, and are named from their peculiar shape, Saddle and Table Hills; the latter is the most southern.

British and German factories, the white roofs of which are conspicuous seaward, are situated on the north side of the entrance to Campo River.

Off the southern point of the river there is a rocky reef that appears at low water and on which the sea breaks heavily. From the entrance, which is about 1 mile wide, the river extends in a southeasterly direction for a distance of 12 miles, and is navigable for boats as far as the Jengwe Falls, which are about 15 feet high and situated 8 miles from the coast; it then breaks up into numerous arms which are inaccessible.

Bar.—The mouth of the river is obstructed by a bar on which, as a rule, and especially in the dry season, the sea breaks violently; the depth over it is from 5 to $6\frac{1}{2}$ feet; strangers should not attempt to cross it. Within, the river is wide and deep.

Anchorage—Buoy.—If from the northward, avoid the shoal of Weber Point by bearings of Point Campo; if from the southward, give the latter point a berth of at least 2 miles. Bring the German and British factories to bear 100° , and anchor on that bearing according to draft. Vessels should not anchor in less than 3 fathoms on account of the swell and cross current.

In Campo Bay, within the line joining Gertrude Point and Campo Point, the depths generally are not more than 2 to $2\frac{3}{4}$ fathoms, decreasing gradually toward the mouth of Campo River; at 1 mile outside this line a depth of $5\frac{1}{2}$ fathoms is found on the southern part of the bay. A red can buoy marks the anchorage.

Landing is very difficult at Campo Point, but good landing may generally be obtained a little to the westward of the Spanish flagstaff on the southern side of the bay, even at times when the bar of the river is impassible. Landing may also frequently be effected on the north side of Gertrude Point.

Boundary.—The Campo River is the boundary between the German and Spanish possessions.

Trade—Natives.—The principal article of trade from this river is ivory, which is said to be of great commercial value. The inhabitants are chiefly Mosekis, Bosyebas, and Pahouins.

The coast from Campo Point trends southerly for a distance of 13 miles to Bata Point.

Bata or Fish Point is a low, wooded, and rounded point, difficult of recognition, with a fringe reef extending $1\frac{1}{2}$ miles offshore, beyond

which the water suddenly deepens. Landing is practicable under the shelter of the reef.

Aspect.—A little to the southward of Campo Point the coast plateau terminates, but about 18 miles in the interior from Bata Point, and a little southward of its parallel, are two small conical hills about 4 miles apart which adjoin the northern part of the chain known as the Seven Hills.

Bird Rocks.—Between Campo and Bata Points, about 8 miles 189° from the former and about 3 miles from the shore, in a depth of 9 fathoms, is a group of three small islets or rocks, the central and largest being about 18 feet above high water. From some positions, the largest rock when whitened by the guano of birds assumes the appearance of a sail, the other two rocks north and south of it being of a darker color. But they are said at other times to appear black, and to be of nearly equal height; the absence of birds at certain seasons might account for the appearance of the rocks varying. The sea breaks heavily against these rocks, but it is not known whether a safe navigable passage exists between them and the main land.

Bata Bay.—This bay lies between Bata Point, on the north, and Cape Two Points, distant $27\frac{1}{2}$ miles 195° on the south, the head of the bay being $7\frac{1}{2}$ miles from this line of direction.

The shores of the bay are low and wooded, with a narrow sandy beach; the coast from Bata Point, 1 mile southward of which there is a small river accessible by boats for a distance of 12 miles, trends 156° for 12 miles to the head of the bay. A heavy swell rolls into the bay.

Otondo (Akoko) River.—There are six rivers falling into Bata Bay, and of these the third from the northward is named Otondo, on the northern bank of which is the trading village of the same name, consisting of a few houses scattered along the shore. Off this river there is good anchorage in from 6 to 4 fathoms, and fresh water is obtainable. There is a British factory at the mouth of the river on the southern side.

Mount Bata is a remarkable conical hill 7 miles inland from the head of the bay, but sometimes obscured by mist in the morning; it has higher ranges behind it, but they are indistinct.

Landmarks.—The great trees near the Roman Catholic mission are visible a long distance off. From about 6 miles to seaward the wooden boat pier and the red road with stone steps leading inshore stand out clearly against the green background. Government house, with its white roof, standing on high ground, is also conspicuous.

Light.—Bata Light is a fixed red light, elevated 64 feet and visible about 10 miles; it is shown from an iron framework structure in Nueva Bata

Anchorage.—Anchorage may be obtained in fairly good holding ground, but heavy swell, in about $6\frac{1}{2}$ fathoms, sandy bottom, with Bata flagstaff bearing 165° . There are also two other anchorages, one in about 3 fathoms, 700 yards from the coast, with the flagstaff bearing 115° , and the other more sheltered in about 4 fathoms, 900 yards offshore, with the Catholic mission house bearing 160° .

Caution.—The soundings along the shore of the bay being very irregular render great caution necessary. The bottom is generally mud, but in many places, especially to the southward, which are not frequented in consequence, there are patches of rocky bottom, and therefore it is necessary to ascertain the nature of the ground before anchoring.

Tides.—It is high water, full and change, at 4 h. 5 m.; rise of tide about 5 feet.

Landing is easily effected on the beach, in front of the boathouse of Woermann's factory (the northeastern of the three), which is somewhat sheltered by some rocks close off it, but it is better to use a surfboat.

The settlement consists of several British, German (three large white houses with sheet-iron roofs, with a flagstaff near them), and Belgian factories, and one French factory; also a Catholic mission, which has a water-power sawmill and machinery for shaping stones for building purposes. A Spanish subgovernor resides at Bata.

The climate in July and August has been found to be pleasant and dry, with refreshing sea breezes. It is healthful, there being little sickness among Europeans.

Ekuku River is about 9 miles to the southward of Otondo River; its entrance is about 165 yards wide and forms a good mark for vessels coming from the southward. It has a depth of about 1 foot on the bar at low water and has been ascended by boats for about 5 miles, after which it is not navigable. At the last of the ebb the water within the bar is fresh but dark in color.

Seven Hills.—Southeastward of Bata Bay is the mountain range known as the Seven Hills, which lies 15 miles inland and extends about northeast and southwest for a distance of 27 miles. This chain of hills is very remarkable from seaward and from a distance presents seven distinct elevations, which culminate in a central. Sharp Peak, 2,786 feet high.

Cape Two Points is low and wooded, with a sandy base, and is surrounded by a sunken rocky reef extending $1\frac{1}{2}$ miles offshore. The whole reef breaks, but especially its northern end.

San Benito River.—The entrance of this river, noted for its trade in ivory, is between Indombo (Heybern) and Joho Points, and is about 1,200 yards broad.

Mbade Point, about 3 miles south by west from Cape Two Points. has a trading village on it. A missionary resides here.

Shoals.—For $\frac{3}{4}$ mile off Mbade Point there are shoals, with a depth of 3 feet, upon which the sea breaks heavily during the ebb.

Indombo Point has a hill standing close over it (not charted), of conical shape and 90 feet elevation, with a large village at the foot. This hill is not easily recognized, and most of the villages are hidden by trees. The most conspicuous object on the north side of the river is the Protestant mission station; the American mission at Bofondo also may be recognized by its white pigeon house.

Joho Point.—On this point is the German factory at its extremity, and a tree standing out in view which can be seen from a considerable distance; a sandy spit extends 1.6 miles northwestward from it, having on its outer extremity from 2 to 6 feet water; between this extremity and the northern shore are several shoal heads of 5 and 6 feet. There is a steam sawmill worked by a Spanish merchant in this locality.

Anchorage.—There is good anchorage in about 4 fathoms, mud, with Joho Point bearing 98° . The chart shows anchorages in about the same depth $1\frac{1}{2}$ miles northward and 1 mile to the southward of this position.

Entrance—Directions.—In entering and leaving the river the lead must be kept going and the position checked by bearings to guard against the current, which is always strong. The sea is always choppy on the banks at the entrance.

The ebb at times runs at the rate of more than 3 knots an hour, which, meeting the swell in the offing, causes the entrance to the river to appear as if barred with breakers. There are no pilots.

The best time to enter the river is a little before slack water at high tide; by keeping Black Point (Outer) in line with Green Point (both points are on the northern side of the river, but not always clearly detached) 125° , a vessel makes a straight course into the river, but will cross a depth of 11 feet only at high water. To carry not less than 14 feet (or 9 feet at low water), steer in with the mission station at Bofondo bearing 104° , and when the remarkable tree on Joho Point bears 151° , steer a 142° course for the mouth of the river.

Anchorage.—When abreast of the German factory at Joho Point anchor about 200 or 300 yards from the shore, with the factory bearing 288° , where the depth is from 3 to 4 fathoms, which depth is preserved for a distance of $1\frac{1}{2}$ miles farther up.

The river.—The San Benito is navigable for about 12 miles, or to within 1 mile of the Yubi Falls, which are three in number, having a total fall of about 40 feet, 6, 8, and 9 miles, respectively, from the entrance. Vessels of not more than 6 feet draft intending to go up the San Benito River should leave the anchorage at the entrance at

about half flood, so as to find water up to Green Point. There were two channels; the one which ran along the south shore has the greatest depth. About $\frac{1}{2}$ mile eastward of the entrance to the Ombe, and nearly $\frac{1}{4}$ mile westward of the village of Eloba, a ledge of rocks uncovering at low water, is marked by a red conical buoy, which must be left on the starboard hand by vessels ascending the San Benito. The French gunboat *Basilic* anchored at about 1,350 yards below Yubi Falls, which was as far as the strength of this stream would allow her to go up.

The San Benito receives two affluents, the Ombe and Utonge, below Yubi Falls, and both are on the left bank.

The Ombe is only accessible to boats.

The Utonge has depths of 9 to 13 feet, and can be ascended as far as the village of Medua, where there is just swinging room for a small vessel. The natives frequently go from the Utonge to M'Bela village on the Kongue, an affluent of Muni River; the time occupied is about one and a half days, a part of the journey being made in canoes.

Inhabitants.—The Combes inhabit the coast and the entrance of San Benito River. They are neither numerous nor industrious. The Molendjes have their villages on the banks, but chiefly on the left bank. These act as middlemen between the Combes and Pahuins, who are not met with below the vicinity of Yubi Falls. This custom is very detrimental to trade, as it prevents the Pahunis from treating directly with the factories on the coast.

Landing.—Outside the river the shore to the northward, and also to the south as far as Indombo, is bordered with rocks, making it difficult for boats to land. About M'Bade Point there are sandy beaches, especially before the Protestant mission, where landing is less difficult.

Tides.—It is high water, full and change, at the entrance of the San Benito River at 4 h. 30 m., the rise being $4\frac{1}{4}$ feet at springs.

The Miter is a remarkable mountain, with a double summit, 3,940 feet high, about 25 miles southeastward from the entrance of San Benito River.

The coast.—From the San Benito River the coast takes a general trend to the southwestward as far as Cape St. John, a distance of 30 miles, and for the whole length the land is low, undulating, and wooded. Along the shore, which is intersected by three rivers, is a narrow, sandy beach, which is fringed in many places by rocky shoals, some of which uncover; while inland the land rises to a moderate elevation.

For 15 miles from the San Benito River the land trends southwestward as far as a salient point at the entrance of the second of

the three rivers just alluded to, and thence falls back into an indentation 8 miles across.

Rivers.—The first of the three rivers lies 6 miles from the San Benito River, and off its mouth are reefs and rocks above water, which seem to render access impracticable.

The mouth of the second river is at a point named Dioni, about midway between the San Benito and Cape St. John; off the northern point of the river breakers extend 1 mile offshore.

The entrance of the third river is the Oue, 8 miles from Cape St. John, at the head of the bight already alluded to, the shores of which are fringed by offlying reefs.

There is a village on the north bank of the entrance to each of these rivers.

Soundings.—From the San Benito River, along the coast to the southward, will be found depths of 5 and 6 fathoms about $1\frac{1}{2}$ miles offshore as far as the second river, but thence, as far as Cape St. John, the same depths extend $3\frac{1}{2}$ miles offshore.

Bokwa village.—At the distance of 9 miles southward of San Benito River is the trading village of Bokwa, near to but not seen from the sea, as indeed is the case with most villages along this coast.

Miter Bank.—Nearly 10 miles offshore, abreast the river southward of Bokwa village, and about 15 miles northward from Cape St. John, is a bank about 3 miles in extent, on which there are depths of 16 and 17 fathoms, with 38 fathoms close to all around.

Dwarf Shoal is a patch of small extent with a depth of $5\frac{1}{2}$ fathoms over it, situated $11\frac{1}{4}$ miles 338° from Cape St. John; it has 17 fathoms close westward of it.

Buenja Islet lies close to the shore, about $3\frac{1}{2}$ miles northeastward of Cape St. John; it is small in extent, moderately high, generally shows green, and is surrounded by rocks, on which the sea breaks heavily. A shallow bank (said by the natives not to exist) extends from the islet for a distance of 2 miles in a northwesterly direction, and on its outer extremity, in 11 feet of water the British naval vessel *Espoir* touched in 1865. This spot lies 356° , 4 miles from Cape St. John, and vessels navigating in the vicinity should be careful to preserve an offing of 3 or 4 miles, and keep the lead going.

Mumunein Rock lies upward of $1\frac{1}{2}$ miles offshore, between the villages of Itunbue and Bilogue (not shown on chart), and is about 1 mile long in a north and south direction, with depths of 4 to 16 feet over it. From the shoalest spot the western extremity of the rocks off Cape St. John bears 192° , distant 5 miles. There is a passage, with depths of not less than 2 fathoms, between this rock and the shore.

Rocks.—In 1842 the ship *Diligent* struck on a rock with about 8 feet water, and injured her rudder; the exact position of the danger was not ascertained, but it was assumed to be 3 or 4 miles 317° from Cape St. John.

A rock with 7 feet least water is reported to lie with Cape St. John bearing 339° , distant about 4 miles.

This is probably the rock on which the *Diligent* struck.

The steamship *Ingbert* grounded on a shoal about $7\frac{1}{2}$ miles 357° from Cape St. John.

The shoal has a least depth of 2 fathoms over it and is about $2\frac{1}{2}$ miles long in an east and west direction.

Cape St. John.—This headland is covered with trees, and from northward appears with three distinct heads, rather high and easy of recognition; against the base of the cape, which is rocky and without a beach, the sea breaks heavily.

In addition to a fringe of breakers which surrounds the cape for a distance of 400 yards, there is a continuous bank of rock formation, with depths of 6 and 7 fathoms, extending out to a distance of $3\frac{1}{2}$ miles westward of the cape, and thence falling suddenly to 20 and 23 fathoms; within this distance, in various directions, rocky bottom will be found.

Landmark.—A large white house, the Spanish Catholic mission, is situated about 2 miles northward of Cape St. John, at a height of 30 feet above the sea, and forms a good landmark.

Mirage.—The shores adjoining the cape are very low, but often when approaching from the westward the large trees have the appearance of hillocks, while the trunks assume a grayish tint, and become elongated; this distortion, which is occasioned by strong mirage, assumes the appearance of cliffs, intersected by broad fissures or ravines, where the trunks are hidden by foliage. This illusion is of frequent occurrence on this part of the coast, but is dispelled on closing with the land.

Caution.—As there is reason to suppose that less water exists along the whole line of coast, between the Kamerun River and Corisco Bay, than is shown on the charts, it is necessary to navigate with caution, but especially so when in the vicinity of Cape St. John, where it is quite possible unknown rocky heads may exist.

Currents.—The currents near Cape St. John run with great velocity and are considerably augmented by the irregularities of the bottom; the stream which comes from the southward beats violently against the cape, whence it is thrown off and then runs swiftly to the northward.

The coast between Cape St. John and Mosquito Point is not easily distinguished. Fogs prevail, especially in the morning; the sea also during the dry season is high.

Corisco Bay.—From Cape St. John to Cape Esterias, the southern extremity of Corisco Bay, the distance is 32 miles 182° . This line touches the eastern end of Corisco Island, and eastward of it the bay known as Corisco Bay recedes 14 miles. The name Corisco is derived from the Portuguese, and was doubtless conferred in consequence of the frequent thunderstorms which visit this locality. This bay would be one of the finest harbors on the coast of Africa were it not for the numerous islets, rocks, and banks, which cause its navigation to be attended with considerable difficulty.

As any written description would fail to convey an idea of all the intricacies of the extensive dangers in Corisco Bay, the mariner is referred to the chart of the bay, which must be used with caution, for the relative positions and delineation of the various shoals.

The natives of the Gabon are the best pilots for the inner waters, of which there are no trustworthy charts.

From Cape St. John the coast trends to the south by east $4\frac{1}{2}$ miles to Corona o Meyaye Point, the northwestern point of Corisco Bay, forming two shallow sandy bights divided by a rocky point, and thence $1\frac{1}{2}$ miles to Mosquito or Bangué Point—on which are detached masses of trees—with an intervening sandy bay. Off the rocky points separating the sandy bays between Cape St. John and Mosquito Point shoal water runs out from $\frac{1}{2}$ to 1 mile, and between Corona o Meyaye and Mosquito Points is a village on the sandy beach.

From Mosquito Point, near which is the town of Calatrava, the shore, slightly elevated and inhabited by the Bulu Tribe, the chief village being Eboco, sweeps back and forms a semicircle 12 miles across to Elcbey Point, and into this part of the bay the Muni River falls into the sea.

From the Elobey Point the coast of the bay takes a southerly trend for a distance of 15 miles to the entrance of the Munda River, the whole extent of this wooded shore being fringed by shoal ground, extending in some places 3 miles from the land.

Mosquito Point Light.—A fixed green light, elevated 59 feet above high water and visible 8 miles, is exhibited from an iron framework support, surmounting a small house erected on the extremity of Mosquito or Bangué Point.

Shoals.—A shoal with a depth of 3 fathoms lies 4.9 miles 270° from Mosquito Point Lighthouse.

A shoal with a depth of $3\frac{1}{4}$ fathoms 7.9 miles 266° from Mosquito Point Lighthouse.

Seagull (Ugoti) Rock.—At the distance of $1\frac{1}{4}$ miles 255° from Corona o Meyaye Point is a small detached rock which dries at low water and breaks at high water if there is the least sea, with 5 fathoms just outside of it. There is also a small detached rock about

awash at low water, 500 yards westward of Seagull Rock. The bottom is very foul between the rock and point; 800 yards inside Seagull Rock there is another rock which dries at low water. Vessels therefore should not attempt to pass inside Seagull Rock.

Directions.—Seagull Rock lies much in the way of vessels coming from the northward and intending to pass northward of Elobey Isles, but by not bringing Cape St. John westward of 3° until Mosquito Point bears 99° , a vessel will pass 1 mile westward of it.

Wreck.—The wreck of the *Macgregor Laird* was reported in 1893 to be lying sunk on the northern side of the entrance to Corisco Bay, 1,600 yards 166° from Seagull Rock, but the position is doubtful.

Corisco Island.—This island, which is moderately high and well wooded, occupies a central position between Cape St. John and Cape Esterias; it is 3 miles in length north and south, with an average breadth of $1\frac{1}{4}$ miles.

The island is completely surrounded by a shoal ridge irregular in outline but extending in some places $2\frac{1}{2}$ miles offshore, and in addition to this extensive shoal there are several detached rocky patches off the northeastern shore of the island. Ugumi, the southwestern point of Corisco, is rocky and without vegetation, and the trees on the southern shore are thinly scattered compared with those on the northern and eastern shores.

Its western shore is rocky, and its rocks, especially on the southern side, are covered with white spots which may be seen afar off, and here as well as at Cape St. John the trunks of the trees are thrown up by refraction, and from a distance assume the appearance of grayish cliffs.

This island belongs to Spain and is under the administration of the subgovernor at Elobey Island.

Anchorage.—Between the southern and southeastern points of the island is a bay of moderate depth, near which is a bight of deep water in which anchorage may be obtained; the northern boundary of this bight is formed by Nengeamegue Reef, which runs off for a distance of 2 miles in an easterly direction from Yoko Point, the southeastern point of the island. At low water, parts of this reef dry, affording a guide for anchoring.

Products—Climate.—The island, which is very productive, is remarkable for the luxuriance of its diversified scenery, consisting of hills, forests, prairies, lakes, etc., all of which are necessarily on a diminutive scale; it grows magnificent woods, and the natives trade in ebony, dye woods, and ivory, which they obtain from the bushmen of the interior of the continent. Limestone is burned, from which cement for building purposes is manufactured.

The climate of the island is more healthful than that of the neighboring coast.

Supplies.—In some parts of the island, water is said to be scarce at certain seasons, but a plentiful supply can always be obtained on the eastern side. The soil produces coconuts, manioc, plaintains, sweet potatoes, yams, groundnuts, and limes; but supplies are difficult to procure.

The population, which is diminishing, is scattered all over the island, the principal village being on the southern shore, opposite Leva Island. They belong to the M'Henga Tribe, who are enterprising traders and daring boatmen. Formerly they were quarrelsome and ferocious, but under the influence of missionaries who have settled among them are now friendly and hospitable to strangers.

The villages in the vicinity of Cape St. John are subject to the authority of the chief of Corisco Island, but the other villages along the shores of the bay are inhabited by a savage race of bushmen.

Directions.—The northern and western shores of Corisco Island should not be approached within $2\frac{1}{2}$ miles, or a depth of 7 fathoms, and on the northeastern side an offing of 4 miles, or a depth of 13 fathoms, should be preserved, in order to pass outside Corisco Banks. On no account should any of the passages southward of the island be attempted by strangers.

Corisco Banks consist of two large and several smaller detached patches, and extend $3\frac{1}{2}$ miles northeastward off the northern coast of Corisco Island, the outer patch, with $3\frac{1}{2}$ fathoms, being 3 miles 42° from Italo Point. At about 1,400 yards southwestward of this there is a patch 1,200 yards in length, on which there are several spots with 12 feet, but on the inner and largest patch there is as little as 3 feet water. These shoals, which do not break, are separated by comparatively deep water channels, but the passages inside or between these dangers should never be attempted.

Leva Island.—This islet, about 200 yards in length, is moderately high, and covered with trees; it lies about 1 mile southward of the southwestern point of Corisco Island, and is surrounded by breakers, especially on the north and east sides; off this latter side they extend $\frac{1}{2}$ mile. The passage which separates it from Corisco Island is only available for canoes. The edge of the shoal ridge which surrounds Corisco Island, passes $1\frac{1}{2}$ miles westward, and 2 miles southward of Leva Island.

Reef.—About 1 mile southeastward of Leva Island is a reef on which, even in ordinary weather, the sea breaks heavily.

Shoals.—There is a shoal 800 yards in length in a north and south direction, with $2\frac{1}{4}$ fathoms over it 2 miles westward of Leva Island, and several heads of 3 fathoms between it and Laval Bank.

Laval Bank.—This dangerous bank, which lies $3\frac{1}{2}$ miles southward from Leva Island, presents on its western side a long line of breakers and sunken rocks; it is $2\frac{1}{4}$ miles in extent north and south, and $1\frac{1}{2}$ miles wide on its northern edge, the outline being very irregular. There is a narrow intricate passage between it and the southern side of Corisco and also between it and the western side of Bañye Bank, both of which should be carefully avoided.

Bañye Island, about 400 yards in length, is low and covered with trees; it lies 5 miles southward of the southeastern end of Corisco Island, and is surrounded by dangers on every side. The island rises from a shoal, half rock and half sand, of which many parts eastward of the island dry at low water.

Konga, a rocky islet which never covers, lies 2,400 yards 240° from the center of Bañye Island.

Bañye Bank.—This bank is 9 miles long in a northeast and southwest direction, with an average breadth of $3\frac{1}{2}$ miles, and on it the depths are very shallow and variable.

Crown Sand.—The eastern part of the bank is marked by Crown Sand, which dries; it is 2 miles 100° of Bañye Island.

East Sand, which is on the extreme eastern extension, also dries and lies 77° , distant 3 miles from Bañye Island.

Channel.—Although the distance between Crown Sand and the southern shore of Corisco Bay amounts to 9 miles, the only available passage is along the southeastern side of Bañye Bank, and near the Crown Sand it is narrowed to $1\frac{1}{4}$ miles; there appears to be a depth of 4 fathoms through it, but as no leading marks can be obtained, strangers should not attempt to enter the bay by this channel.

Currents.—Over the banks which encumber the bay the current runs often from 1 to 2 knots, its direction varying with the tide. Seaward of the islands it generally runs to the north by east under one knot, and in the bay to the eastward during the flood, and to the westward during the ebb.

Elobey Isles.—About 10 miles 77° from the northeastern end of Corisco Island, and off the mouth of the Muni River, are the two Elobey Isles, with numerous small islets (all wooded), rocks, and banks in the immediate neighborhood. The islands are based on an extensive shoal, surrounding the group, and connected with the mainland, at the southern point of the entrance to the Muni River, which is 3.3 miles distant from the inner, and smaller of the two islands—while in a seaward direction, this bank, with from 1 to 3 fathoms water, extends $5\frac{1}{2}$ miles in a northwesterly direction. The large island has few inhabitants.

Channel.—There is a channel between the islands, and to the eastward of the small island, which is used by vessels of light draft; it is easy when known, but should not be used by strangers.

Settlement.—The Elobey Isles belong to Spain. On Little Elobey are the residence of the Spanish Government officials, who are subject to the governor general at Fernando Po, a church and several English and German factories, but many of the houses are poor and not suitable for the Tropics. A doctor is attached to the establishment. The climate is not generally healthful—cases of blackwater fever occur.

Caution.—Owing to the changes in the mouth of the Muni River the chart of Corisco Bay should be used with caution when navigating in the vicinity of the Elobey Islands.

Communication.—The Elder Dempster Co.'s steamers call.

Tides.—It is high water, full and change, at Elobey Isles at 5 h.: springs rise 7 feet.

Anchorage.—Between Corisco and Elobey Islands, at a moderate distance from either shore, the bay forms one great anchorage, with depths varying from 9 to 12 fathoms, into which (by a reference to the chart) it will be seen, that with common precaution there is no difficulty in entering.

Good anchorage will be found in about 5 fathoms on the eastern side of Corisco Island, with Italo Point bearing 294° , and Yoko Point, its southeastern end, 224° ; in this position a vessel will be well sheltered from the southwestward, and the holding ground is so tenacious, that the tornadoes from the eastward need not be feared.

Though the water is usually quite smooth at this anchorage, without any surf on the beach, it occasionally happens that a swell sets in without any apparent cause, when the rollers break on every shore of Corisco Island.

There is good anchorage for small vessels drawing under 10 feet off the southeastern point of Little Elobey. Large vessels anchor inside Elobey Bank, about $1\frac{1}{2}$ miles northeastward of Little Elobey, in 5 fathoms mud, where there is fair shelter. The channel being unbuoyed, it is not advisable to proceed for the inner anchorage without a pilot, whose aid can be procured by making the usual signal.

The wind during the day generally prevails from the westward, gathering strength toward noon; sometimes it continues with variable force through the night; squalls, with much rain, thunder, and lightning, are here experienced both on and offshore.

Muni River.—This river, which falls into the sea at the northeastern angle of Corisco Bay, is 1 mile broad between the low wooded points of Dieke and Coco Beach and fronted by rocks at its entrance, which lies 11 miles in a southeastward direction from Mosquito Point. The river is accessible for large vessels as far as Gande Island, 8 miles from the entrance.

Depths.—The least depth in the approach appears according to the chart to be about $4\frac{1}{2}$ fathoms, but the river channel being encum-

bered with banks and rocks, renders navigation difficult, and the services of a pilot necessary.

Anchorage.—The chart shows anchorages in from 4 to 5 fathoms 3 miles westward of the mouth, and one in 10 fathoms northwestward of Coco Beach Point.

Directions.—After passing Mosquito Point, if wishing to enter the Muni River, vessels should employ a pilot, and have boats ready to sound ahead; the channel will be found between the shoal tongue extending in a northwest direction from the Elobey Isles, and the southern edge of a bank, which fronts the eastern part of the great bay, lying between the river and Mosquito Point. This channel is from $\frac{1}{2}$ to 1 mile broad, with depths varying from $3\frac{1}{4}$ to 6 fathoms, but it is subject to great changes, as the banks off the entrance to the river are continually shifting.

Caution.—From a partial examination of the banks off the Muni River by several British naval vessels in 1872 and 1873, it was found that the depths and positions of them had materially altered since the survey in 1836 and 1838, therefore every precaution should be taken when navigating in this locality.

Coco Beach Point.—There is a British factory on this point. The landing is on the beach, in front of a shed, but there are rocks in all directions. The customhouse is about $\frac{1}{2}$ mile to the northward, near the village of Duma. Vessels anchor in 10 fathoms, mud, northwestward of the beach.

Ocoya Point is nearly 2 miles eastward of Coco Beach Point.

Isuku River, the principal entrance, is at Etoku, but there is also an entrance westward of Ocoya point; it is navigable for about 6 miles.

Uvinia Point.—Butica, a French settlement, was established in 1901 on Uvinia Point. The governor's house and its flagstaff, as well as the roadway, are conspicuous. There are British and German factories here. Westward of the point the anchorage and landing are exposed, but eastward of it the anchorage is 7 fathoms, mud, and the landing are both good.

The river off this point narrows and the current is strong, some times running 4 to $4\frac{1}{2}$ knots.

Gande Island is about 5 miles above Uvinia Point on the southern bank, and a few miles eastward of it are the two Evongue Islands at the entrance to Temboni River.

Noyo River runs in a southerly direction; its entrance is obstructed by a bar, on which stands Tabalon Island. The channel, which is on the eastern side of the island, is narrow, and fit for vessels drawing 6 feet; 3 or 4 miles up stream the navigation becomes very difficult.

Temboni River.—The passage into this river, which is between the Evongue Islands, is narrow, but can be used by vessels drawing 6 feet. This river is the principal affluent of the Muni, and is easily navigable as far as the village of Ekododo, after which it narrows rapidly. The Nondde is navigable for boats only; it is encumbered by tree trunks. Banie River is only practicable for boats.

Uttongo River is $5\frac{1}{2}$ miles 85° from Gande Island. The coast between it and Banie River is fringed with rocks. At 3 miles from its entrance is an island named Bakalekeke, surrounded by an immense sand and mud bank, which leaves only a very narrow channel. The villages of M'Bola and Mayembie are situated on the north and south banks, respectively, opposite the island. Above this point the river divides into three branches, one of which has been ascended for about 10 miles, with a depth of about 3 to 4 feet.

Kongue River.—The mouth of this river is opposite Uvinia Point, its entrance, with a depth of 3 or 4 fathoms in it, is about 1 mile across. On the eastern side of the entrance there is an islet named Ivelo and the village of Kogo on the mainland. About 5 miles upstream it contracts at its confluence with the Mangiani, and off the village of Mianda there is only 6 to 8 feet of water, after which the depth decreases to 3 feet. The water is brackish at Mianda, even at low water.

Inhabitants—Products.—The neighborhood of the Muni and its tributaries is inhabited by Panhuins, Balusekyamis, and in that of the Kongue by Balengis.

The chief products are ebony, rubber, dyewoods, but not much ivory.

Elobey Point, 4 miles to the southwestward of the southern entrance point of Muni River, has a French customhouse and a flagstaff on it. The village near it may be seen from the offing.

The coast to the southward of Elobey Point is intersected by small streams and fronted by rocky plateau extending 2 miles from it, but 1 mile westward of Buyumba River is a rocky patch which breaks, and a shoal tongue extends for $1\frac{1}{2}$ miles westward of Madekele Point. Northward of the point there is a village. About 4 miles southward of Madekele Point is Laval Hill.

Munda River.—The entrance to this river lies in the southeast angle of Corisco Bay, $10\frac{1}{2}$ miles eastward from Cape Esterias, and, like the Muni River, the navigation is rendered difficult by banks and rocks.

Marabout Bank.—A coral bank about $\frac{1}{2}$ mile in extent north and south, which dries at low water, lies $3\frac{1}{4}$ miles westward from Laval Hill, on the eastern side of Munda River entrance. A black conical buoy marks the southwestern side of the bank (missing in 1914).

Akanda Point—Buoy.—This point is rounded, and has two little hills a short distance from the coast. A mud flat, nearly dry at low water, extends upward of 1 mile northward off the point, and a shoal tongue (reported to have extended) with $2\frac{1}{2}$ fathoms on its extremity 3 miles northeastward from it. A red buoy with topmark is moored 4.4 miles 14° from the point (missing in 1914).

Entrance.—The entrance lies between Akanda Point and the east shore of Corisco Bay, and is 5 miles across; but the navigable channel is narrowed to little more than 2 miles, between the shoal tongue running off from Akanda Point, and the shoal water off the eastern coast.

Depth.—The depths in this channel vary from 3 to 8 fathoms.

Shoals.—There is a patch with 7 feet at low water, soft mud, and several other shoal heads to the northward of it, on the western side of the entrance to Munda River. A red conical buoy is moored eastward of these shoals. (Missing in 1914.)

Munda Islets are the three wooded islets about 5 miles southward of Akanda Point; on Munda Island, the largest, there is a village and the French custom-house; on Essimba, the most northern of the Munda Isles, are ruins of the former settlement.

Shoal.—Two miles eastward of Munda Islets, and nearly in the center of the Munda River, lies a bank of soft mud, which dries at low water.

The river.—Five miles within the entrance, the river branches off into two arms, the smaller, known as N'Kogue River, taking a southwest direction, intersects the southern shore of Corisco Bay, and extends to within $\frac{1}{2}$ mile of Kringer, on the northern shore of the Gabon River, thus forming the peninsula of Esterias; this small neck of land is used as a portage, over which boats are drawn.

A little beyond Munda Islets, N'Kogue River becomes very narrow; the banks are very low and covered with wood, and apparently thickly populated. Both the above rivers abound in redwood and ebony.

The rivers Abambo, Kohi Djemboe, and Ebe drain into the Munda.

The coast.—From Akanda Point to Cape Esterias, the general trend of the coast is westward, with well-defined Rocky Point about midway between the two. An extensive bank of shoal ground, of an irregular triangular form, extends off the whole of this shore, the apex, with a depth of 3 fathoms, being $4\frac{1}{2}$ miles northward from Rocky Point.

Cape Esterias.—This cape, which shows as a decided point from the westward, forms the southern point of Corisco Bay; it is low and wooded, and has a rocky reef extending nearly $\frac{1}{2}$ mile in a northerly direction, on which the sea breaks very heavily; while farther out in the same direction, and 2 miles offshore, is the edge of the 3-fathoms line, on the northwestern extremity of the shoal bank

which extends between the Munda River and the cape. The depths northwestward of the cape are irregular; the chart shows a patch of $3\frac{1}{2}$ fathoms $5\frac{1}{4}$ miles off.

There is a French customhouse and a Roman Catholic mission on the cape.

Anchorage.—At night, the winds from the offing make the anchorage off Cape Esterias undesirable.

Tides.—The tides at Cape Esterias are three-quarters of an hour earlier than at Libreville in Gabon River.

Currents.—In Corisco Bay the general direction of the current becomes so modified by the islands and banks as to render any definite description impossible; but at the distance of 18 miles offshore, on the parallel of Cape Esterias, the general direction is northward, while abreast of Corisco Island, at a distance of 13 miles, the trend of the current is NE. by N., or nearly in the direction of Cape St. John, with a velocity of from 1 to 2 miles per hour.

Coast.—Between Cape Esterias and Megombie Point (False Cape Esterias), which is a comparatively high and wooded promontory, are some villages inhabited by the Bengas, the most important of which are Salme at Cape Esterias, and those around the Roman Catholic mission, at a short distance northward of Megombie Point. The roof of the chapel is whitewashed, and is conspicuous from the offing, which, together with the tall trees, render this portion of the coast easily recognized.

From Megombie Point (False Cape Esterias) to Cape Santa Clara (Joinville) at the entrance of the Gabon River, a distance of 5 miles, the coast runs to the southward and is bordered by rocks extending at places 1 mile offshore, on which the sea breaks heavily during the dry season. Sandy beaches mark the mouths of the Rivers Yocogo, Calega, Mebanga, Ediongue, and M'Boma. These rivers have openings into the sea during the rainy season from November 15 to July 15; during the dry season they are closed, and the beach becomes continuous.

The coast presents an almost uniform aspect of wooded cliffs of a height of about 65 feet; Calega and Ediongue Points are slightly distinguishable, being indicated by large rocks and rugged cliffs of a yellowish color.

Mombaliquito or Cape Faux is situated about $1\frac{1}{4}$ miles to the northward of Cape Santa Clara (Joinville); it is a slight projection, and abreast of it the 3-fathom line extends $1\frac{1}{2}$ miles offshore.

About midway between Cape Mombaliquito and Cape Santa Clara is Ouquoue Point, with high trees upon it, some of which are iron-wood; and as the point is completely bare, the trees are very conspicuous. There are two large sandy beaches, one northward of

Ouquoue Point and the other southward of it. Northward of Ouquoue Point, near Mabendia (a remarkable rocky point), there is a small Roman Catholic village, surrounded by banana trees and extensive plantations. There are many offlying rocks on a shoal between these two capes, extending $1\frac{1}{2}$ miles from the coast.

Pilots.—The Bengas of Cape Esterias are nearly all good pilots for the coast and the Munda and Muni Rivers. They are always ready to offer their services to vessels arriving off their villages. Too much confidence, however, must not be placed in them. They know the coast well, but are not so well acquainted with the depth and nature of the bottom off it.

Gabon River.—This river, the native name of which is M'Pongo, takes its rise among the Sierra del Crystal, and empties its waters into the Atlantic a few miles north of the Equator. Its mouth forms a bay, which is the finest harbor on the west coast of Africa, and here on the right bank the French formed a settlement in 1843.

Like some of the palm oil rivers of the Bight of Biafra, the Gabon may be more properly termed an estuary than a river. The entrance is formed between Cape Santa Clara or Joinville (with a white beacon on it), and Pongara Point, 9 miles southward from it. The banks of the river are covered with a rich vegetation and intersected by numerous creeks. The general direction of the river is to the southeast by south for a distance of 16 miles, and thence southeast by east for 19 miles, to Pungue (Black) Point, a promontory dividing the estuary into two branches, viz. the Komo River to the eastward, which is from 2 to 3 miles broad at its mouth, and may be ascended for a distance of 45 miles; and the Ramboe River, $1\frac{1}{2}$ miles broad at its mouth, which runs southeastward for a distance of 40 miles.

Depths in entrance.—The Gabon is accessible to the largest ships and affords commodious anchorage and good shelter for a fleet, for although the numerous and extensive shoals which obstruct the entrance render the navigation somewhat difficult, they increase the security of the anchorage on both sides of the river. The least depths in the entrance channel, according to the chart, is from 6 to 7 fathoms.

Cape Santa Clara or Joinville, about 60 feet in height, may be recognized when bearing between 347° and 77° by its extremity being cultivated (for which purpose the trees have been partially cleared), as well as by a yellowish spot caused by the falling of a portion of the chalky rock of which the cape is composed. A line of breakers, which may be easily seen and avoided, fringes the cape in fine weather at the distance of $\frac{1}{2}$ mile, and in bad weather more than 1 mile from the coast, but the 3-fathom line extends nearly 2 miles in a southwesterly direction, within which distance it is not prudent to approach the cape.

Beacon.—A conical beacon, 16 feet high, built of bricks and white-washed, surmounted by a ball formed by two iron disks, has been erected on Cape Santa Clara. Having a green background it is a good landmark and is visible from a distance of 6 or 7 miles.

Pongara (Sandy) Point, the northern extremity of a low peninsula on the southern side of the entrance of the Gabon, is composed of alluvium on which the sea has deposited sand, and, although low and covered with tufts of grass, may readily be identified by a remarkable cluster of mangroves, known as Fetish Wood, and two smaller woods to the southward.

A mast, 74 feet high, for radio, was erected on this point in 1902.

The point is reported to have extended and altered considerably from the sketch on H. O. Chart No. 2373 (1916) and should not be used for fixing a vessel's position.

Gombe Point, $4\frac{1}{2}$ miles southward of Pongara Point, is elevated, marked by some reddish spots, and surrounded by some conspicuous trees; it serves as a good landmark, especially for vessels coming from the southward. The holding ground, in case of vessels anchoring off it, is good.

Light.—A flashing white light, elevated 187 feet, and visible about 17 miles, is exhibited from an iron column, 39 feet high, painted in black and white horizontal bands, on the summit of Gombe Point. The lighthouse is a conspicuous landmark; the red tiled dwelling is 30 yards southwestward of it. For details, see Light List.

(Temporarily fixed white, 1915.)

Landmarks.—The summit of Mont Bouet, 328 feet high, which was formerly cleared of trees, except a single tree 150 feet in height, has again become overgrown. Mont Baudin may be known by the ragged appearance of its trees. The chapel with a red tower of the Catholic mission at Libreville and the corrugated iron buildings at Kringer are visible at a distance.

Aspect.—The right bank of the river between Cape Santa Clara and Owendo Point is elevated and composed of picturesque hills of calcareous formation. At 1,400 yards southeastward of Mont Baudin are two hills, called Umbrella and Trou, each about 460 feet high; Umbrella Hill can be recognized by a tree on the top in the shape of an umbrella, but it is difficult to recognize these hills. From here the chain slopes toward the southeastward and terminates at the junction of Igume and Lohuay Creeks.

Dangers in entrance—**Themis Bank**, on which the French frigate *Themis* struck in 1877, lies in the approach to Penelope Pass, about 5.3 miles 236° from the beacon on Cape Santa Clara. This patch of sand, about 200 yards in extent, has a depth of 18 feet over it at low water. There are other heads, with depth of $3\frac{1}{4}$, $3\frac{3}{4}$, 4, and

5 fathoms over them, situated at and within the distance of about 1 mile of the above patch, with deep water between and around them.

Mouche Bank, which has a least depth of $1\frac{1}{2}$ fathoms over it, lies 4 miles northwestward from Pongara Point; it is upward of 1 mile in length, and has a detached patch of $2\frac{1}{2}$ fathoms outside it.

Buoy.—A red spindle buoy, marked 2 R, surmounted by a cone, is moored in 9 fathoms of water about 1 mile off the northwestern end of the bank.

West Bank.—This bank is a narrow, isolated patch, 1 mile in length, with $1\frac{3}{4}$ fathoms least water on its western end, nearly $3\frac{1}{2}$ miles northwestward of Pongara Point.

Pongara Bank is an extensive shoal, extending 2.7 miles northwestward from Pongara Point. The general depths over it are from $1\frac{1}{4}$ to $1\frac{3}{4}$ fathoms, but in some parts there is as little as 3 feet. This danger is generally distinguished even in fine weather by the passage of the strong tidal current over the shoal ground.

The Mouche, West, and Pongara Banks occasionally break, and their doing so is mainly attributable to the action of the tides, which are strong and cause eddies when opposed to the wind.

Butterfly (Papillon) Bank is a small patch with $3\frac{3}{4}$ fathoms water, and though detached from Pongara Bank, is close to its eastern edge; it lies about 1 mile from Pongara Point.

Postilion Bank is a rocky shoal, about $\frac{1}{2}$ mile in extent, and carries a depth of 19 feet; it is situated $3\frac{3}{4}$ miles southwestward of Cape Santa Clara. The bank is generally shown by eddies.

Caraibe Bank is 2 miles in length northwest and southeast, with a least depth of 2 fathoms, situated 3 miles northward of Pongara Point; it is the most important danger to be avoided on the northeastern side of Penelope Pass, the main channel into the Gabon.

Buoy.—Caraibe Bank is marked by a black conical buoy moored on the southeastern edge of the bank. This buoy should be left about 1 mile on the port hand in entering the river. (Missing in 1914.)

Middle (Milieu) Bank.—The 3-fathom line of this shoal is separated from a similar depth on Caraibe Bank by a narrow channel, having from 5 to 7 fathoms water. The bank itself is of gravel, and within the 5-fathom line, is upward of 2 miles in length, the least known depth being $2\frac{1}{2}$ fathoms; but as it lies considerably northeast of the fairway boundary of the main channel, it does not affect the navigation of the river.

Southeast Banks are two banks of gravel and rock, separated by a narrow $6\frac{1}{2}$ -fathom channel; they cover an extent of $1\frac{1}{2}$ miles in length north and south, and have the depth of $2\frac{1}{4}$ fathoms on the northern part, and $3\frac{1}{4}$ fathoms (situated 2 miles eastward of Pongara Point) on the southern patch. These banks appear to be extending westward (1915).

Buoy.—A black conical buoy, surmounted by a topmark, is moored near the depth of 3 fathoms on the southern head of the Southeast Banks.

Caution.—The buoys in the Gabon River are frequently out of place, and sometimes break adrift, and are therefore not to be depended on.

Vialetes Rocks are coral patches consisting of three distinct heads, having, respectively, $2\frac{1}{4}$, 3, and $3\frac{1}{2}$ fathoms on them at low water. They lie $3\frac{3}{4}$ miles 5° from Pongara Point, and render the passage between Nisus and Caraibe Banks dangerous. The rocks are marked by eddies.

Nisus Bank, $2\frac{1}{2}$ miles in length northwest and southeast, is formed of irregular depths varying from under 5 to $1\frac{1}{4}$ fathoms; this latter depth is at the southern end of its central portion. The Caraibe Shoal, Vialetes Rocks, and Nisus Bank are situated on the same plateau, defined by the 5-fathom line.

Recherche Bank, with $1\frac{1}{4}$ fathoms water, lies off Akwengo Bay, within Cape Santa Clara. There is a passage 1 mile broad, with a depth of $4\frac{1}{4}$ fathoms, between it and the Nisus Bank.

Alligator Shoal, with a least depth of $1\frac{1}{4}$ fathoms over it, is $1\frac{1}{2}$ miles in length, and lies off the northeastern shore near Gueguay Creek; there is a channel between it and Adour Bank, having a depth of $3\frac{1}{4}$ fathoms. This shoal is only in the way of vessels taking the passage either northward or southward of Nisus Bank.

Tides.—It is high water, full and change, at Libreville, at 5 h. 20 m.; springs rise 8 feet. At Pongara Point at the same time as at Libreville; springs rise 6 feet. In Igume Bay the tide is half an hour later than near Libreville, the rise of tide being the same.

Tidal streams.—The tides are strong and irregular; the stream during the flood runs to the northward outside the shoals, thence strongly past Cape Santa Clara and up the river, setting to the northeast when abreast of the Caraibe Bank, but regains the channel before reaching the Southeast Shoals. The stream during flood runs at springs at the rate of $1\frac{1}{2}$ to 2 knots an hour; while at the ebb (which, in the port, often continues 10 hours), frequently attains a velocity of 4 knots and sometimes even 5 knots. The stream at the ebb sets fairly through the channel, but to the southward outside the entrance. Thus, when entering or leaving Gabon by the Penelope Pass, the tendency of the tide is on the flood to set a vessel toward the eastern shoals, and on the ebb toward the western.

Freshets occur in the Gabon principally at the commencement of the rainy season; they are, however, occasionally experienced at every period of the year, and are sometimes sufficiently violent to interrupt, for several days, communication with the left bank. During these floods a nauseous odor pervades the whole estuary.

Bores occur during the dry season, at which times the outer shoals break and the shore at Libreville is difficult of approach. A heavy swell sets into the estuary, but communication with the shore is seldom interrupted by it.

Current.—The current generally runs to the northward, about $\frac{3}{4}$ mile an hour; but the direction is sometimes changed to the southward with the change of the moon.

The direction of the current is influenced by the tidal stream.

Winds and weather.—Nearly throughout the whole year the breezes at the mouth of the Gabon alternate from land to sea, thus permitting the entry or departure of vessels under sail. The sea breeze sets in generally at 11 a. m. and is at its greatest force between 3 and 4 p. m., as its direction varies from southwest in the dry season to west-northwest in the wet season.

The land breeze, which begins between 11 p. m. and midnight, blows from southwest to east, and is strongest from 6 to 7 a. m.; during the dry season the land breeze lasts till 10 a. m.; between the two winds, for two hours, calms or variable airs prevail.

The heaviest tornadoes occur from February to April. They generally blow about sunset, commencing from the southwestward, they turn to the northeastward, blowing hardest at southeast, when they cease; but storms of a less violent character may be experienced at any time. Thunderstorms, which are more frequent at night than in the day, are short but very violent, and accompanied by heavy rain.

The winds along this part of the coast between June and October are variable during the 24 hours, and range from south-southeast to south-southwest, and thus vessels beating to the southward should take advantage of every slant, and keep the gaining tack. They should also manage to be inshore toward the early morning, in order to benefit from the land breeze.

Seasons—Climate.—There are two seasons, the dry, from June to September, and the wet, broken by two or three weeks drier weather, at the end of January, during the remaining nine months of the year. The mornings are always cooler than the nights. Fog banks pass across the estuary at the end of June. During the dry season there are no storms or tornadoes, springs dry, and vegetation is arrested.

The climate is hot, moist, and unhealthful, causing malarial fever and anemia.

Anchorage.—Trading vessels will find good anchorage with a muddy bottom on the plateau off Glass at about from $\frac{1}{2}$ to 1 mile from the shore, according to draft, but vessels anchoring here and farther southward must avoid a shoal named Malouine Bank, which extends 1 to $1\frac{1}{2}$ miles from the coast nearly as far as Owendo Point.

Prohibited anchorage.—Anchorage is prohibited within the area bounded by lines drawn through the following points: Themis Bank Buoy, the cable tower of Kotonou (near Breton Point), the church of Libreville, the green cable buoy, the shore at Rogolay Creek, Pongara Point, and the point of intersection of the parallel of Pongara Point with the meridian of Themis Bank Buoy.

Pilots.—There are no pilots for the entrance of the Gabon River, but nearly all the natives of Cape Esterias are acquainted with the channels.

Directions.—In approaching from seaward the currents are very uncertain, sometimes running to the northward and sometimes to the southward, with variable velocities. They must be seriously considered in making the land.

When in the vicinity of the Gabon River, and uncertain of the exact position of the ship, the soundings will give a good indication of it, the 100-fathom line runs parallel to the coast 25 miles from it; seaward of this line the depths increase rapidly, toward the land they gradually decrease. In making for the estuary it would be well to remember that the land on the northern side of the estuary is high, when compared with that to the southward, which is very low. If approaching the northern coast from seaward, the trees on the Esterias Peninsula will be seen from a distance of 12 miles, and on a nearer approach Cape Esterias will make like an island. On opening out the mouth of the river, the summit of Mont Bouet, 328 feet high, may be identified, though it is difficult to make out. Mont Baudin, 2 miles southward of it, is surmounted by trees which present a ragged-top appearance.

From the northward.—Vessels from the northward should endeavor to make Cape Esterias. If in consequence of fog or approaching night the marks through the channel can not be seen, it would be prudent to anchor in a suitable depth; and if the ebb be running it would also be advisable for a sailing vessel to anchor, as the stream at the ebb, which sometimes attains the rate of 4 or 5 knots an hour, can not be stemmed without a fresh sea breeze.

Caution.—The buoys marking the channel into the Gabon being exposed, their positions are unreliable; it is therefore absolutely necessary for vessels entering this river to be able to fix their positions by shore objects and the lead.

Penelope Pass.—The broadest, most direct, and therefore safest channel into the Gabon is the one known as Penelope Pass.

Vessels should keep outside the 10-fathom line until the position has been satisfactorily determined, then steer for the Themis Bank Buoy (black conical with topmark), round it at a distance of about 1 mile, and steer to pass about 1,400 yards northward of Mouche Bank Buoy (red spindle with topmark).

If the buoys are not in position Mont Bouet, bearing 85° , or Mont Baudin 92° , lead between Themis and Mouche Banks.

Vessels, when sure of their position, and if Gombe Point is visible, may, with bearings of that point as a guide, pass between the Themis and Postilion Banks to the position 1,400 yards northward of Mouche Bank Buoy.

Leading mark.—The leading mark through Penelope Pass, from abreast Mouche Bank Buoy is Ikana Point, southern extremity of Coniquet Island, in line with Owendo Point 124° ; it passes through the position given above, but can not be trusted, as the objects are low and distant between 15 and 20 miles; it is probable that they will not be visible until abreast of Caraibe Bank. Vessels should, however, steer for them on this course, the position being continually fixed until they are sighted; the stream at the flood sets toward Caraibe Bank. The leading line passes about 800 yards southward of the Southeast Bank Buoy (black conical with topmark), after passing which the anchorages already described may be steered for. This buoy must not be passed less than 110 yards. If this buoy is not in position, bearings of Mont Baudin will indicate when the shoal is passed.

Other channels.—There is a narrow channel for small vessels between Pongara Point and Pongara Shoal, but a pilot is absolutely necessary.

There is an available passage for small vessels between Nisus and Recherche Banks, but it is not recommended, as there are no leading marks; another channel which is sometimes used, but not by strangers, lies between Nisus and Caraibe Banks.

There is also a channel between Middle and Southeast Banks, and vessels taking this route alter course from the leading mark through Penelope Pass, when Gombe Point is shut in with Wingombe Point, and thence steer for the Roman Catholic Mission Church on an 81° bearing; this church in line with Mount Baudin leads just northward of the Southeast Bank; but in either of the above cases the saving of time would be inconsiderable.

From the southward.—Vessels approaching the Gabon from the southward should first sight the lighthouse on Gombe Point, and abreast of the point, when the land about Cape Santa Clara should be visible, shape course for Mouche Buoy, keeping clear of the western edge of the shoal by bearings of Gombe Lighthouse; after passing the buoy, proceed as given above through Penelope Pass.

Northern Bank—Akwengo Bay.—Immediately within Cape Santa Clara the shore recedes and forms Akwengo Bay, where very small craft may find anchorage during the rainy season but not in the dry. From Cape Santa Clara to the head of the bay (where the M'Tanday River enters it), rocks, the outer one of which covers at

spring tides and dries 6 feet at low water, forming a small islet, lie at $\frac{1}{2}$ mile off the shore, rendering it almost inaccessible; a rock with only 6 feet water on it lies $\frac{1}{2}$ mile southeastward of the cape.

During the rainy season some small streams flow into the bay, and fresh water may then be found.

The coast.—From the head of Akwengo Bay to Gueguay Creek, a distance of 7 miles, the coast is bordered by tall trees which grow down to high-water mark. At half tide a steep sandy beach is exposed, on which the sea breaks heavily in the dry season. The beach should not be approached to land on at high water, but during the slack, at low water, landing is possible. There are several villages at a short distance inland; they are called Pinedes by the natives, and are hidden from seaward by plantations.

Adour Bank extends $1\frac{1}{2}$ miles off the coast midway between Cape Santa Clara and Libreville; in the dry season the sea breaks over two patches of rock off Pandinou Point.

About $4\frac{1}{2}$ miles northward of Libreville there is a slight elevation with a village on it called N'Kogo, at the back of which the N'Kogo River or N'Kogue takes its rise and flows eastward, emptying itself in the Munda River.

Gueguay Creek.—The shore rises at Gueguay Creek, and is fronted by chalky beds which dry out 200 yards at low water. The creek is at the southern end of the 7-mile beach already described; it is marked on the north by tall trees forming a big clump, and on the south by Norman or Kringer Point. The small Gueguay River flows throughout the year, and its mouth is not closed in the dry season; it is navigable for boats for a distance of $1\frac{1}{2}$ miles.

The shore from Gueguay Creek trends to the southeastward and is bordered by a succession of plateaus intersected by ravines, with brooks flowing through them. Between Norman Point and Breton Point the shore is fronted by rocks which cover and uncover, with sandy beaches at the heads of the coves.

Breton Point.—At the distance of 2 miles southeastward of Gueguay Creek is Breton Point, and close to the shore, between the two, are the villages of Kringer, Kwaben, and Louis, with an aggregate population of about 1,400; of these villages, Kringer is the most important.

From Breton Point the rocks continue to front the shore as far as Glass Point, where they end, and southward of which is a small cove where the seine can be hauled.

Catholic mission.—The blockhouse, erected in 1843, stands on an eminence near the shore, 600 yards southeastward of Breton Point, and near it is a convenient landing place; it has now been abandoned as a stronghold and forms part of the garden of the Roman Catholic mission, whose church, whitewashed dwelling

houses, schools, and workshops, all with red roofs, are in the immediate vicinity, are conspicuous and can be seen well from the sea.

The point on which the mission stands is marked by a yellow patch in the cliff, near which is a landmark about 6 feet in height, and a little to the northward of it is a white tower with a red roof, for the reception of the telegraph cable. A ridge of rocks which cover and uncover extends for 200 yards off the point.

Libreville Cove—Piers.—An iron pier, about 100 yards long, projects from the stores of the Compagnie des Chargeurs Reunis, situated about 200 yards to northward of the harbor piers. This pier admits of the loading and unloading of the company's lighters in sufficient depth of water. At the foot of the plateau are two small piers forming a small harbor. These two piers are out of repair. In the middle of the entrance and almost at equal distances from the piers is a rock, marked by a white and red iron beacon with spherical topmark; the channel for boats is midway between the rock and the southern pier, where there is barely enough water to float a whaleboat at low water. The pierheads have loose stones lying off them and should be avoided, especially at low water. The northern pier is used for coaling purposes and the southern for embarkation, which, however, can not be effected at low water. The 3-fathom line extends from 200 to 1,000 yards off the piers. The area within it is known as Meteore Bank.

Lights.—A fixed white light, elevated 23 feet, is shown from a red pyramidal framework tower, 25 feet within the extremity of the southern pier, and a fixed red light, elevated 13 feet, from a white structure on the northern pier.

Buoy.—The only buoy remaining in the roadstead is a sphericonical green buoy, moored about 1 mile offshore to mark a point in the boundary of the prohibited anchorage area.

Vessels must anchor to the southward of the line joining this buoy and the harbor entrance.

Anchorage.—The anchorage off Libreville for merchant vessels is nearly 1 mile southwestward of the piers and southward of the mooring buoys in about $4\frac{1}{2}$ fathoms water, where the bottom is mud. The bottom off Libreville, between the piers and Breton Point at 1 mile to the northward, is foul and rocky, being full of holes, to the distance of 1 mile offshore. Vessels generally moor north-northwest and south-southeast to the flood and ebb.

Sometimes the sea gets up at short notice in the anchorage, making communication with the shore difficult for lighters, especially when the wind is against the tide.

During the dry season (about June to September) small vessels anchor farther up the river, near Owendo Point, to avoid the surf which breaks on the shore at Libreville.

There is reported in 1915 to be less water in Libreville anchorage than charted.

The settlement is situated on the top of a small hill, among mango trees, in form of a quadrangle, in which is the Government house (surmounted by a tower) and hospital, with law courts, prisons, magazines to the south, telegraph station, church, and convent to the north. Behind Government house are barracks and magazines. Near the customhouse flagstaff at the inner end of the jetty are steps parallel to the shore, leading to the Government house. These buildings are conspicuous from the offing.

The plateau, on which Libreville is situated, is much cut up by ravines. The land is to a certain extent fertile, and covered with ferruginous rocks, cuttings from which are used for building, and layers of limestone, which produce excellent chalk.

Glass village.—About 1½ miles from the piers of Libreville Harbor in a slight indentation between Pira and Glass points, stands the village of Glass, the principal place of trade in the whole river. Within it on a beautiful hill, named Baraka—derived from Barracon—is the American mission, with numerous buildings and spacious grounds, which occupy the site of what some years since was a noted slave factory. Between Libreville and Owendo Point the shore is fringed with houses, belonging chiefly to the European merchants.

Coal.—The French Government keep a supply of lump coal and patent fuel in sheds near the piers at Libreville. There is no private stock of coal.

Repairs.—Small repairs can be effected.

Supplies.—Since the seat of Government has been removed to Brazzaville supplies are difficult to obtain. Fresh meat is only obtainable twice a week, and vegetables are scarce. Fresh meat of indifferent quality can be obtained. Little fruit can be obtained, except the common mango, in season.

Water is plentiful on both shores, but on the eastern side of the river there are rivulets which run into the sea, whence supplies may be procured, but only at low water. Water must be filtered as often as possible.

Boats can land on the beach between the two piers and pump water from a cistern.

Lighters.—The Compagnie des Chargeurs Reunis owns the only two lighters in the port. They hold about 150 tons each, and are moored in ordinary weather off the company's iron pier.

Communication.—French steamers from Marseille call every alternate month; from Havre every month. British Elder-Dempster Co.'s steamers leave Liverpool every four weeks for Libreville. German steamers of Woermann Line also call. There is communication also with San Thome.

Telegraph.—Libreville is connected by telegraph with Cape Lopez, Fernand Vaz, Loango, and Brazzaville. There is a cable across the river connecting Libreville with the village of Denis, from which the land line starts.

Inhabitants.—The Gabon was for a long time the center of the slave trade. The various inhabitants of the upper rivers have, in consequence, become extinct, and their place has been taken by inhabitants from the interior. These people are called M'Fans (Pingues, by the British, Pahuins by the French). They differ considerably in manners and character from the original people. It appears that the aspect of the country must be altered as a result of this change, especially if the more recent arrivals succeed in their aptitude for agriculture. The Mpongwe, Bulus, and Balakais are, in consequence of disease and alcoholic excess, fast disappearing. They will probably become extinct before long.

Products.—The principal products are ivory, ebony, rubber, and dyewoods, which the Pahuins collect in the forests in the interior and dispose of through middle-men and agents.

Coast.—Around Glass Point are some rocks, which extend about 600 yards from the coast as far as Ogombray Creek, whence the coast for nearly 2 miles, to Lohuay Creek, is low and bordered with mangroves, and forms a slight sandy bay, an excellent place to haul the seine.

Between Lohuay and Owendo Points, a distance of 4 miles in a southerly direction, the shore is low and bordered with mangroves; a muddy sand bank extends nearly 1 mile off the small creek called Loembani, at about midway between Lohuay Creek and False Owendo Point. Along the whole distance from Norman Point is a road connecting the various villages.

Malouine Bank is a muddy sand bank extending offshore for $\frac{1}{2}$ mile.

Ogombray Creek.—At the north entrance point to Ogombray Creek there is a point of sand on which the schooners and steam launches of the factories are beached for repairs, or to have their bottoms cleaned; they have to wait until high water to cross the rocky bar which blocks the entrance of the creek.

Lohuay Creek, which enters this bay just within Lohuay Point, has its mouth obstructed by a bed of rocks awash at low water, which extend 600 yards off the point. At high water launches can enter and proceed 2 or 3 miles up the creek. The village of Nomba is situated upon a small elevation at the entrance, on the southern bank.

Owendo Point projects wedgeways to the southward, and is about 65 to 80 feet high. The Konikue Hills, to which the point rises at about 2 miles northeastward of it, are higher by 160 to 260 feet, and are surmounted by tall trees. The plateau of Owendo is partially

cleared and cultivated; it is more healthful than the plateau of Libreville, and appears to be marked out for a hospital or lazaret. A native village stands upon the southwestern slope of the plateau.

Owendo Bay, formed between Owendo Point and Peini Point, $2\frac{1}{2}$ miles to the eastward, and Coniquet Island, affords good anchorage; there is a strong tide and a tide rip in it, but no swell as at Libreville. The bottom is of mud, making the holding excellent. The anchorage is either under shelter of Owendo Point or in the middle of the channel between Peini Point and Coniquet Island in 4 to 5 fathoms, but a $2\frac{1}{2}$ -fathom bank has to be passed to reach the latter.

Igume Bay.—The space northward of the line which joins Owendo Point and N'Gumbi Point to the eastward is called Igume Bay, which is sheltered from the sea and tide rip, but choked up with mud, so that a vessel drawing more than 13 feet should not enter it.

In the bight of the bay is Igume Creek, in which there is upward of 13 feet water from the mouth for 3 miles up, and boats can ascend for 4 miles, but the bar is apparently nearly dry at low water. On the Owendo shore is the large village of Alenekeri, and a little farther to the northward is the village of Konikue; both villages are Pahuin.

Coniquet Island.—This island lies opposite the mouth of the Ikoi River, and Ikana Point, its southern point, is 2.6 miles south-eastward from Owendo Point. The island is well wooded, fertile, and has excellent springs in it; one spring in the southwestern part of the island, where the ruins of an old village are, is perpetual. The coast of the island is low along its northern side, but rises to a high conical hill on its southern end, which is faced with perpendicular cliffs. The island is steep-to on the north and south, but a mud bank extends east and west of it. There are two large villages on it.

Ikoi River is immediately eastward of Igume Bay. A large bank of muddy sand lies off the eastern point of entrance and extends for 1 mile up the river to where the mangroves cease. The entrance channel is about 50 yards from the rocks bordering Peini Point, which is the western point of entrance; in the channel there is a depth of 10 feet at low water. A vessel drawing not more than 12 feet water can enter by waiting till half flood. Just after passing the huts of the Bulu Ben fishing village inside of Peini Point, take the middle of the river, where there will be from 12 to 21 feet at low water. There is anchorage with good holding ground anywhere in the channel, but the best is off the villages of Ayaya and Rigoho on the left bank, 2 miles above Peini Point, where water and some provisions may be procured. At a little more than 1 mile

above these villages the river divides into two branches; the western branch is called the Macuma River; at its head are three other branches, the Mawisch and Bollissokoe, which can be ascended to the foot of the hills in which they rise, and where there are some Pahuin villages.

The eastern branch retains the name of Ikoi, and carries 13 feet water for 3 miles up to M'Bon Mogel, a Pahuin village on its left bank. When entering this branch keep close to the large mangrove point of the left bank, as a shoal runs off from the opposite point; keep close to the left bank for $\frac{1}{2}$ mile and then keep in the middle of the river. Anchor a little more than $\frac{1}{4}$ mile below M'Bon Mogel, which will be easily recognized by having a castellated house on a promontory. A short distance above M'Bon Mogel the Ikoi is divided again, the left branch continuing to be the Ikoi, and at 1 mile farther up the N'Kogo joins it; beyond this junction the two streams are navigable at high water for canoes to the foot of the hills where their sources are.

There are some Pahuin villages on their banks, and the village of N'Kogo is near the source of the stream bearing that name. The Ikoi and Munda Rivers are not connected, their sources being about $1\frac{1}{4}$ miles apart, and separated by hills of from 200 to 260 feet in height. A road leads from N'Kogo village to the Pahuin village of Auvan, situated on the height near the source of the Munda, which flows into the Bay of Corisco.

The western or Macuma branch is navigable for vessels drawing 16 feet water until abreast of the small creek which runs at the foot of Saint Pere. Above this it is obstructed by rocks and sandbanks, and is only navigable for boats for 2 miles, as far as the village of Macuma on the left bank, and then by canoes.

All the villages upon the left affluents of the Ikoi are inhabited by Pahuins, who trade specially in redwood. These natives make their barter on the Munda River. Numerous roads intersect the country by which the Pahuins are enabled to communicate with the Munda.

North Bank, from the Ikoi River to Dongila, is fronted by large banks of sand, rocks, and mud, and is not safe to approach. The land is elevated, and covered with trees and vegetation. On it may be seen Tsokue Peak, near the village of Adomoga, the villages of Abuna, Etamayen. Westward of the entrance to Banjia Creek the Rogole River, inhabited by Pahuins, who cultivate bananas and manioc for sale.

The village of Dongila is situated on the north side of the entrance to Komo River, about 12 miles eastward of Coniquet Island. There is a factory on the shore at Dongila and a Roman Catholic mission house on the heights above, which can be seen for a considerable distance.

Surprise Rocks, which appear to be above water, lie in the middle of the entrance to Komo River, about 190° , distant $2\frac{1}{2}$ miles from the Catholic mission at Dongila village. Irongombene Island, in Ramboe River, touching either the east or west entrance points of that river, lead clear respectively eastward or westward of Surprise Rocks. There are patches of 6 feet northwestward, distant 2 and 3 miles from Surprise Rocks.

Basilic Rock is of small extent, with a depth of $1\frac{1}{2}$ feet at low water and from $1\frac{1}{2}$ to 2 fathoms close-to; it lies with Assango Point bearing 69° , distant 1.4 miles. A patch of 4 feet lies about 1,400 yards westward of it.

Vessels should pass southward of the above rocks by bearings of Sika Island.

Komo River.—The entrance to this river lies between Assango and Pungue Points; it is only navigable by light-draft vessels and with the assistance of a pilot. This great affluent of the Gabon has its entrance on the northern side of the head of the inner basin, being separated from the mouth of the Ramboe River by an extensive island. The general direction of the river is east and west. It contains a number of small islands, numerous mud shoals, and a few rocks. The shoals often change in position and extent, and the bottom is so irregular that the water suddenly decreases. Komo River is almost entirely inhabited by Pahuins.

Depth.—The depth in the entrance between Assango and Pungue Points is about $2\frac{1}{4}$ fathoms.

Sika Island.—When entering Komo River the little island of Sika, on the southern side, at $6\frac{1}{2}$ miles above Surprise Rocks, is remarkable for the size and graceful form of its trees; it is surrounded by an irregular rocky bottom and a shoal extends from the western end of the island for 1,800 yards down the river.

Maga and Tcholio Rivers.—On the same side of the river at rather more than 1 mile below Sika Island is the mouth of Maga River, which is narrow, but when in it it can be ascended by small craft for about 6 miles, and there seems to be good water for boats about 12 miles up to the village of Tornebein. The Tcholio, though unsurveyed, joins the Yambi at the Pahuin village Ivanga.

Assango River, about 5 miles above Surprise Rocks, is on the northern shore and nearly opposite to Maga River. There is a village named N'Gava at its mouth, on the eastern point, off which lies a ledge of rocks.

About 5 to 6 miles from the entrance it divides into two branches, the Inkube, the largest, which is not populated, and the Assango proper, which is narrow and bordered with rocks, well populated with Pahuin traders. Small vessels can ascend to the third village.

Komo River, continued.—From Assango River for about $4\frac{3}{4}$ miles, as far as the steep white beach of Leuve, the northern bank should be followed. There are two villages of Leuve, one above the other to the eastward and below the beach. Ninge Buende Island, with the village of Akele on its northern side, is about 1 mile beyond Leuve; the proper channel to be taken lies to the northward of the island; it is narrow and deep, and is called *Le Trou de Diable*, or the Devil's Hole, on account of the strong tide which runs through it. Two large Pahuin villages, Alun and Afenega, are situated on a hill on the northern bank, which is bold here, and is fringed with rocks. The anchor may be dropped in the places shown on the chart.

Ninge Uate Island can be passed on either side, but the deepest water is on the southern coast. Opposite its eastern point on the southern bank is the Pahuin village of Bumba, $\frac{1}{2}$ mile beyond which is a dangerous sunken tree. Mafu Point, on which there is a village, is on the north bank; the point is bold and covered by mangroves. Opposite Mafu is Sombie Island. The channel runs between them. Off Timbie village and Ehrman factory is an excellent anchorage in 4 to 5 fathoms, mud, about 150 yards from the bank.

Ogula Creek is narrow, and navigable for boats only. It is thickly populated by Pahuins, who trade in redwood, and are inclined to be unscrupulous.

From here the navigation, though not difficult, requires experience. It is safest at low water, when the wreck off the Makormabun Banks and other dangers are visible. The channel takes a sharp turn between Alona and Bekune villages on the south, and N'Jua Creek on the northern bank.

Elobe River, the entrance to which is on the southern side, is nearly 13 miles above Leuve. It is a small stream, navigable for boats only, with several villages on its banks. Opposite the village of Deko, situated on the western side of the entrance to the river, there is a bank of muddy sand, on which a vessel may lie for repairs.

Ninge Ninge Island.—This island is situated at the entrance to the Elobe and Bokue Rivers. The large sand bank, on which vessels can careen, extends from its western point, and the ridge of rocks from its eastern side nearly surround the island. There is a channel, narrow but comparatively deep, between it and the south bank of the Komo; northward of the island there is only a depth of 2 feet at low water, but there is a convenient anchorage for waiting for the tide, which rises rapidly. There is also a channel northeastward of the island.

The water is fresh and excellent at Ninge Ninge. The water tank takes water to Libreville. Storms are frequent.

The rise of tide is from 9 to 10 feet, and the stream is fairly strong, especially at half tide.

There is a British (Holt) and a French factory (Brandon) on the island, and a British factory on the left bank of the river higher up.

Kango.—On the northern shore, opposite Ninge Ninge, near the abandoned village of Kango, are two villages and a British factory, and good depots in connection with other factories at Libreville. The administrator resides here, and a local force.

Upper branches.—Above the island the main river is divided into two; the Bokue River (navigable as far as Karamaien) is the name of the southern branch, and the northern one continues as the Komo, along the northern side of Ninge Ninge and to the north-eastward.

The Komo is well populated above Ninge Ninge, but its channels are obstructed by rocks and sand banks, small vessels, however, of 6 feet draft can proceed with safety as far as Varmoko, 11 miles farther on. Above Varmoko the river is embedded in the spurs of the Crystal Mountains, and obstructed by trees, but it has been ascended as far as the Pahuin village of Takama. At a little more than 9 miles above Ninge Ninge there is an American Protestant mission. At Ayeme there is a factory, and a military station at Fullah.

Tidal influence is felt as far as Belli, 1 mile below Varmoko. Tchale Creek connects the Komo with the Bokue; it is navigable for small vessels on the flood tide.

Pilots for the upper portion of the river can be had at Ninge Ninge.

Bokue River.—The Bokue River, after having passed a rock and sand bank at its entrance, is easily navigated for 7 miles from Ninge Ninge. There are good anchorages midstream off the villages of Duma, Akineton, Jogeбат, after which the channels are obstructed by rocks and sand banks. It has been ascended as far as Karamaien.

Southern Bank.—**Pongara Point** is described elsewhere.

The coast inside Pongara Point takes a general southerly trend for 12 miles as far as Obelo Creek. From 1 mile within Pongara Point the coast is lined by mangroves as far as the head of the estuary. The coast from the point to Rogolay Creek is free from banks. From Rogolay Creek to Obelo Point banks of mud, with sometimes rocks, border the coast for a distance of 2 miles off.

Rogolay Creek.—At 3 miles from the point is Rogolay Creek, or Denis River. The entrance to the creek is distinguished by a cluster of tall trees, with one taller than the rest. At the mouth of the creek are two sand banks which dry at low water and the passage to the creek lies between them; at spring tides, small vessels of not more than 6 feet draft might find the northern Rogolay Bank a good place for beaching, in order to clean the bottom.

There is good anchorage in 3 to 5 fathoms mud, about 1,000 yards northward of the entrance to the creek.

Vingueyahua Creek lies about $1\frac{1}{2}$ miles southward of Rogolay Creek.

Mina Creek with a conspicuous red tree on a hillock a little northward of its entrance, has the fishing village of N'Djoue at the foot of it, and a remarkable clump of trees on a rising ground, known as Ponta Mina Mood, nearly 2 miles inland. The village of Mina is at the foot of the wood.

Petit Denis, or Little Denis, is a village in a small cove, about 5 miles southward of Rogolay Creek, and situated at the foot of a hillock, upon which is a cluster of trees similar to those at the entrance of Rogolay Creek.

Apopai Creek has two entrances, 1 mile to the southward and 1 mile to the northward, respectively, of Petit Denis, which form the island of Petit Denis. One of these channels has its source in Ponta Mina Hill, $6\frac{1}{2}$ miles southward of Pongara Point. This hill is the most conspicuous on this part of the coast.

Voileliay Bay—Mangrove Bank.—The coast from the entrance of Apopai Creek eastward is cut up by a number of creeks, the principal of which are named Mombai, Tutiai, Obelo, and Assombe, to which access is nearly impossible. Voileliay Bay is comprised between Cigognes Bank and the coast of Petit Denis. It is encumbered with shoals which render it impracticable. The shoal named Espinassy, between Tutiai Creek and Obelo Point uncovers $1\frac{1}{2}$ miles seaward, is about 1 mile long, and lies between Petit Denis and the shoal extending from Obelo Point. About $\frac{1}{2}$ mile to the northward, abreast Mina, are two small shoals which uncover, the one rock and the other mud. The shoal extending from the coast southward of Rogolay Creek is known as Paletuvier (Mangrove) Bank.

Cigognes Bank.—On the outer part of the extensive mud flats fronting Obelo Creek and Assombe River, and 2 miles northeastward of the entrance of the former, is Cigognes Bank. This shoal extends $3\frac{1}{2}$ miles northwest and southeast, and is about 1 mile in breadth; the western part always dries, and the remaining portion partially uncovers at low water.

Half a mile outside Cigognes Bank is a tongue running parallel to that bank with 1 fathom on it.

Channel.—Between the Cigognes on the one hand and Little Denis Banks and the mud flat extending northward from Obelo Point on the other there is a channel 800 yards broad, and steep-to on both sides, which leads into Obelo Creek.

Eguirigui (Uongue) Point, on the eastern side of the entrance to Assombe (Uongue) Creek, is low, with a remarkable tree, and a mud bank extending $4\frac{1}{2}$ miles in a northwesterly direction. This

point forms the southern limit of the outer basin of the Gabon, and is distant 7 miles 176° from Owendo Point, the northern boundary.

Perroquet Island.—This island, which is of small extent, low, thickly wooded, having a conspicuous tree at its northern point, and uninhabited, lies $2\frac{1}{4}$ miles northward from Eguirigui Point, and $3\frac{1}{4}$ miles from Coniquet Island. A bank which partly dries extends 2 miles in a northwest direction from the southwestern point of the island; and a shoal also extends upward of 500 yards off its eastern end.

The channel between Perroquet Island and Eguirigui Point, off which are situated the Turquoise, Rubis Banks, and Stony Island, which show white against the dark background of mangroves, is very shallow, and with patches of stones and broken shells, which dry at low water; that between Perroquet and Coniquet Islands has depths ranging from $4\frac{1}{2}$ to 6 fathoms.

Mafuga and Igume Rivers.—From Eguirigui Point the southern bank trends southeastward for a distance of $4\frac{1}{2}$ miles as far as Mafuga River, in which there are depths from 7 to 16 feet for a distance of $6\frac{1}{2}$ miles from the entrance; on the left bank of this river are two villages.

The Igume River, on the southern bank, lies 4 miles eastward of Mafuga. Ozumbele Point lies between the mouths of the Mafuga and Igume Rivers.

Ramboe River.—This river lies 5 miles eastward of Igume River. Point Vidjue, the western point of its entrance, is bold and distinguished by a remarkable tree, near which is the Pahuin village of Nango. A bank of 4 feet extends northward from Irongombene Island, a low wooded island in the entrance, parallel with the eastern bank, for a distance of $2\frac{1}{2}$ miles, narrowing the channel to 400 yards; the least depth in this part of the channel is 7 feet at low water.

The channel.—The eastern side of Ramboe River should be kept on entering, until abreast of Irongombene Island, whence there is no danger for small craft as far as Chinchua village.

The rivers Yambi and Bilagone unite with the Ramboe, 5 miles southward of Irongombene Island.

Chinchua village, situated on Ramboe River, will be seen from abreast Irongombene Island. Opposite the village is a good place for small vessels to careen; here the small steamers belonging to the factories established in the Gabon make good their repairs. Fish and fruit are obtainable at the village.

Villages.—All the villages in the Ramboe River have disappeared, with the exceptions of Mandji and Acondjo, but a small village named Massa has been built a short distance above the old site of D'Jogohefan.

Acondjo is the most important of these, having a population of about 3,000 to 4,000. There is good anchorage off it in 26 feet. Some fresh provisions can be obtained. The river here is only about 90 yards broad, and as the tide is still felt, vessels have to moor head and stern. Above Acondjo the river is navigable to M'Vomezo. D'Jogohefan is 4 miles above M'Vomezo, and Issanga still higher up. After this the river ceases to be navigable.

About 4 miles below Acondjo there is a creek which communicates with Lake Azingo; and from there by the rivers Adyomba and Vinue to the Ogowe, to Lamberene. There is also a path from Acondjo to Duma on Lake Azingo.

The tide is felt at Jogohefan, but the water is fresh 20 miles above it. The current runs strongly from 2 to 3 knots in the Ramboe.

The basin of the Ramboe produces mahogany and ebony.

The coast.—From Gombe Point to Cape Lopez, the westernmost point of South Africa, the distance is nearly 67 miles 213° , the intervening coast falling back into a bight 23 miles in extent. The southern part of this bight is known as Cape Lopez Bay, and here the land becomes broken by the mouths of several rivers, the principal of which is the Ogowe River, while the approaches to the shore are shallowed by the delta of the various streams.

The shore from Gombe Point to the Equator trends in a southerly direction, and is moderately high and very level, with a narrow sandy beach, which is intersected by several creeks. About the Equator, at the distance of 3 miles inland, is the northern shoulder of a line of hills or downs about 100 feet high, which continue southward in a direction parallel to the coast for a distance of 15 miles. In latitude $0^{\circ} 4'$ south one of these downs is very remarkable, being composed of sand, covered with scrub, with a cliff on its western side; it shows above the trees which skirt the shore and assumes from seaward a reddish tint. The northern side of this down forms a gentle slope to the summit, which is nearly horizontal, and falls suddenly on the south side; when seen from the westward it assumes a distinctive character and forms a good landmark. Abreast of it, near the sea, is a village.

At the distance of about 7 miles farther south, at the termination of the range of downs, is another remarkable hillock, white, bare, and flat topped, which is also seen above the trees of the coast.

Soundings.—From the Gabon to Sangatanga the soundings are remarkably regular, excepting off the Paps, where a bank extends, having its 5-fathom line at the distance of 3 miles to seaward, upon which the depths generally are about 2 fathoms less than those found north of it.

Water.—In latitude $0^{\circ} 2'$ south good water may be procured from a river which falls into a small bay, and its position may be

recognized by a sudden break in the trees. The best anchorage off the bay is in 6 fathoms, mud, about 3 miles offshore, with the northernmost Pap bearing 158° , and the break in the trees abreast the river entrance 93° ; closer in the bottom is rocky. Boats may land in the corner of the bay, except when the rollers set in heavily. The mouth of the river occasionally shifts as much as $\frac{1}{2}$ mile in a short time.

Reef.—There is a reef upon which the sea occasionally breaks, stretching 1 mile offshore in a west by north direction. This danger should be avoided, especially by boats cruising at night; there is an appearance of a passage between this reef and the shore.

The Paps are two round hills, which form good landmarks, between latitude $0^{\circ} 13'$ south and $0^{\circ} 15'$ south; they lie north and south about 1 mile apart, and are about 2 miles from the coast. On the shore, midway between the Paps, is a running stream of good fresh water, and near it is a remarkable round clump of light-green trees close to the beach, on which sometimes there is very little surf. It is, however, necessary to be cautious in landing, both on account of the surf and the natives, who are fierce and treacherous.

Fanaes Islet.—This small wooded islet lies in latitude $00^{\circ} 25'$ south abreast the mouth of a small stream of water, from which it is distant about 1 mile; in the passage between there is a depth of only 6 feet.

Aspect.—Nearly abreast of Fanaes Islet is a village, and behind it is a considerable clearing extending also down to the beach, which is fringed with single trees, while on either side the wood is dense close to the water's edge. Within this village, which can not be seen from seaward beyond a distance of 6 or 7 miles, is a town consisting of a long row of houses on the ridge of a hill bare of trees, which may be easily distinguished 14 or 15 miles off.

Anchorage.—On standing in, the soundings decrease regularly from 13 to 3 fathoms, in which depth a vessel may anchor about $2\frac{1}{2}$ miles from the land, with the Paps bearing about 36° and the low village 98° .

Mount Sangatao.—This hill rises 7 miles from the coast, and presents from the westward a nearly horizontal summit, with a gradual slope toward the south; in clear weather it may be seen from a distance of 20 miles. Though of slight elevation, the mount shows out well above the low wooded coast, and is the best mark for recognizing Sangatanga.

Sangatanga Bay.—This bay forms a slight indentation in the coast $4\frac{1}{2}$ miles broad and 1 mile deep, its northern point, Sangatanga, being 5 miles to the southwestward of Fanaes Islet. The shores of the bay are low and wooded, with a narrow sandy beach, and terminate southward in Tambenione Point.

Tambenione Point is 6 miles northward of Mount Sangatao. From northward it assumes an arched form and shows out somewhat as a salient feature from seaward. Off this point a reef of rocks extends 1,600 yards in a westerly direction, while an extensive shoal runs off to a distance of 8 miles in a northwesterly direction. On the extremity of this shoal there is a depth of 2 fathoms, with only 1 fathom a short distance within the edge, and there is every reason to suppose that the edge of the bank continues, with an irregular outline, to about $1\frac{1}{2}$ miles outside Fanaes Islet.

Caution.—The approaches to Sangatanga Bay are only imperfectly known, and the soundings, both in this locality and off Cape Lopez, are very irregular; the greatest caution is therefore necessary.

Town.—Just within Tambenione Point is the mouth of a small stream, on the right bank of which, and visible from seaward, stands the town of Sangatanga.

Buoy.—A buoy, with staff and diamond topmark, is moored $2\frac{1}{2}$ miles northwestward from Sangatanga Point.

Lee Shoal.—This danger, with only 9 feet water, was discovered by the British naval vessel *Lee* striking on it in 1864. It lies 67° from Cape Lopez, and 300° 10 miles from Tambenione Point; about $2\frac{1}{2}$ miles outside it is an isolated patch of $4\frac{3}{4}$ fathoms; these are apparently outlying heads of the immense bank that nearly fills up Nazareth Bay.

Ogowe or Nazareth Bay is the name given to the deep opening in the coast formed by the debouching of the great Ogowe or Nazareth River, and other rivers, into the sea. It is comprised between Weze or N'Gueze and Apumanda or Fetish Points, a distance of 6 miles. Weze Point is $5\frac{1}{2}$ miles 216° from Tambenione Point, the coast between being low and wooded. This coast was first explored by the Portuguese, who in the year 1484, under Diogo Cam, started from the factory in El Mina, crossed the Equator, and discovered the Kongo or Zaire River.

The mud brought down by the rivers has almost filled up the bay with an immense shallow bank, that nearly dries in many parts, and which extends northward for a distance of 5 miles off Fetish Point.

On the eastern side of Ogowe Bay, in continuation from Weze Point, are the following small rivers: Weze River, the entrance to which is closed by a mud bank; Abua Uiri River, up which a small vessel can proceed and procure fresh water; and Lisboa River, which is also navigable, having the large village of Lisboa on its banks, where fresh provisions can be procured. The entrance of Lisboa River has mud banks on either side, which uncover at low water.

At the head of Ogowe Bay are the entrances to the rivers N'Chile or Adué, the Gangue, and the Ogowe; the two first named are both navigable for small steamers and communicate with Ogowe River

to the westward. The whole of the western side of Ogowe Bay between Fetish Point and Ogowe River is fronted by an extensive sand bank which uncovers in many places at low water.

River entrance.—A mouth of the Ogowe enters the sea at head of the bay, of which Fetish Point forms the west extremity. This entrance is dangerous; it is fronted by flats which extend about 11 miles off the entrance of the river, with a general depth of about 9 feet at low water. These flats are subject to frequent changes, and as the bottom is hard sand and the sea breaks heavily at times, particularly in the dry season, entrance to the river should not be attempted without the assistance of a pilot.

Gubie, Ningue, Gogue Islets.—About 3 miles within the entrance points of the bay, at the mouth of the Ogowe River, are three small wooded islets, the largest and western of which is Gubie Island; the others are Ningue and Gogue, the eastern and smallest.

Depth—Bar—Directions.—The depth at the entrance is 4 feet at low water during the dry season.

To enter the river.—Small steamers from the northward should skirt the coast from Sangatanga Point at a distance of 4 miles, steering for Fetish Point to avoid the shoals off the coast; the islands at the head of Ogowe Bay will open out from Point Weze (N'Gueze), first Gubie Island (which from a distance appears to be surmounted by a small hill), then Ningue Island, and when it is entirely open of the point (the opening having the appearance of a white line in the midst of the dark background of trees growing in the water) steer for it, taking care not to widen the opening. Thence, avoiding the shoals off Weze (N'Gueze) Point, pass close eastward and southward of Gubie Island, to avoid the shallows extending nearly across the channel from Gogue Island (here there is but 4 feet at low water in the dry season); thence keep the concave side of the river. Snags are dangerous, many of them being partly embedded in the bottom, rendering extreme caution necessary. Kanie Islet, surrounded by a sand bank, is situated at the first bend in the river, after which Ninge Sampatja or Perroquet Island will be passed.

N'Qola is the first village well in sight, which is met with on the right bank, at about 20 miles above Gubie Island; here is the customs station and that for the pilots. Wood for fuel may be obtained here. The small sailing vessels which still trade on the river stop there, as the tide is felt as far as this even in the dry season.

Ogowe River.—The Ogowe is one of the great rivers of Africa, and the largest strictly equatorial river in the world, its course lying fairly along the line for over 600 miles; its breadth varies from 100 to 2,200 yards; islands often diminish this, but they do not hinder navigation. In the lower part the banks are generally flat, and covered with mangroves, higher up are plains of papyrus, which are

succeeded by fine trees. The hills begin in the neighborhood of Lambarene, and continue more or less to the mountains in the vicinity of N'Djole. Its main affluent is the N'Gunie entering on its southern bank, and the others the Ivindo and the Okanda, both enter on its northern bank above N'Djole. The river has an immense delta, which commences at Lambarene, just below where it receives the waters of the N'Gunie. The delta region is tradeless and supremely damp; indeed, the whole of it and the country from the Gabon to Sette Cama, save the strange bubble-shaped mountains like Mounts Sangatao, Mandji, and Okoneto (not charted), is under water in the "long wet."

Depths.—The depths vary considerably from about 3 feet to 6 fathoms.

Tides—Current.—The tidal influence is felt as far as Rembo Mandji, but at the village of N'Qola, a few miles higher up, a rise and fall takes place, but the current is always running down.

The strength of the current varies with the seasons and increases in speed as the river is ascended. It runs at the rate of 1 to 2 knots in the lower part during the rainy season and from 3 to 4 knots in the upper part, the lower part being much reduced by the water dividing into the numerous mouths of the Ogowe. There is probably little or no current in the delta during the dry season.

The river level is generally highest at the end of April and during May, and lowest in the dry season—July and August. Navigation is then very difficult for vessels drawing more than 3 feet. The level rises from September to November, but falls during the little dry season in December. At some places the difference of level is from 13 to 16 feet.

Navigation.—The navigation of the river is always difficult and intricate, both on account of the rocks, sand banks, and snags, and also the strong current, which attains a speed of 4 or 5 knots occasionally. On the approach of a tornado it is much better to anchor at once, as every object is obscured during its passage. In the rainy season also it is necessary to guard against floating trunks of trees, which come down with great force. Night navigation should not be resorted to except on an emergency. In all cases it is absolutely necessary to have a pilot on board.

Lower Ogowe.—The Yombe mouth, within the bar, is quite safe mid-channel. Below the village of N'Qola are two narrow and difficult channels, named Rembo Mendji and Rembo N'Komi, which communicate with the Ogowe.

There are native pilots at N'Qola for the Fernand Vaz Mouth.

Middle Ogowe.—Kamara and other villages are on the northern bank of the river, above N'Qola. Opposite Nango, about 10 miles above Kamara, is an arm leading to Affogozzo River, and shortly

above this the Ogowe divides into three branches by the islands of N'Kia and Buiti. These channels present no difficulties. Above this the banks become more numerous. At Azintongo the Incongongie Creek (obstructed by weed) leads into the Wango or Obando River to the Fernand Vaz Mouth. The channel lies northward of Areungue Island. N'Gubue Island is about 4 miles above Areungue Island. The Obando River joins the Ogowe a little below the Ninge Saka Islands, which it is better to pass to the northward of, after which there is a village named Ogovitzo, where large quantities of firewood can be obtained. At the side of the village is the entrance to a lake rich in rubber. N'Goumbi village is near it. Chinganyana Passage presents no difficulties, but is subject to change. Near Nionge Islands small chains of mountains of moderate height appear, and red cliffs appear on the banks of the river. The passage between these islands is intricate. There is a bank off the village of Lambagene which must be avoided. Above Lambagene are the villages of Oronga and Ongomo, and the creek N'Komo leading to Lake Z'Onange. The northern bank near the village of Arumba must be passed close to. Opposite Arumbia is the creek named Aningo Revo, leading to Lake Z'Onange. The creek known as Uzugavitza leads to Lambarene; it is longer and shallower but has less current than the main river.

Lambarene Island, where the French resident resides; here are also English and German factories, and French and American mission stations. The village of Lambarene is on the western bank a few miles higher up. The anchorage is before Hatton & Cookson's factory, where the holding ground is good. In the dry seasons the river is only navigable for craft of about 3 feet draft.

Above Lambarene navigation is difficult, on account of the numerous sand banks and strong currents. This part of the river is densely populated, and the trade considerable. The channels often change. Progress can only be made safely by use of the lead. Near Ererebolo the western bank is followed, and from the village of Etage, just opposite, the eastern bank must be kept on board. The current is very strong here. Near Talaguga large rocks emerge even at high river level.

N'Djole Islands are a group of islands on the first of which is a Protestant mission. The settlement is on the western bank, and consists of a number of factories opposite the third island. The Roman Catholic mission is on the eastern bank. A little above N'Djole navigation for steamers ceases.

Affluents—N'Gunie River.—This river enters the Ogowe about 5 miles above Lambarene. It is navigable for vessels drawing from 6 to 7 feet during the wet season and for boats only during the dry season. It is encumbered by shoals, making the channels narrow and intricate. From its entrance to the Saba Falls its length is 40 to

50 miles, being from 150 to 50 yards wide. Navigation ceases at the falls, but native craft go farther up.

The greater part of the trade of the Ogowe passes through the N'Gunie. There are many factories and collectors of the products, which consist of ebony and rubber; ivory is scarce. This river has two small and difficult affluents, the Dabo and Koi.

Eliva Z'Onange Lake has three entrances from the river, the Bando, Aningo, and N'Komo; in the first two the current runs from the river into the lake, and in the last named from the lake to the river; in the last also the navigation is said to be the best.

The lake is about 15 or 18 miles long, and about 15 broad, but it is difficult to get the exact dimensions, as it is encumbered by innumerable islands. The navigation is very easy at all times of the year; it is free from banks and shoals, and has depths of 3 to 6 fathoms. The shores are inhabited by Gallois. Though there is trade in rubber and mats, the chief industry is fishing—the lake abounds with fish of all kinds, which are dried and stocked by the natives. There are also a number of birds and animals.

N'Gumba or Vinue River enters the river about 10 miles above Ninge Saka Islands; it is tortuous and the depths are irregular. Navigation is impracticable during the dry season. Nion Lake is small, with a very narrow entrance. Roge Lake is larger, with an easy entrance. Orongo Lake has in it an island named Kobie, opposite which is a narrow and difficult passage to the Orongo Uango River, which is said to be a large arm of the Ogowe, and thickly populated. These lakes are connected by the N'Gumba River, which is said by the natives to extend far into the interior. The Lemonto River leads to Lake Azingo; its banks are high wooded cliffs. On its western bank is Ebuko Lake, and on its eastern side is the Adyomba River leading to Lambarene.

Lake Azingo is about 9 or 10 miles long and has a maximum breadth of 2 miles. A great number of rivers empty themselves into it, the principal being the Sukala and D'Agouma. The general depths in it are from 2 to 3 fathoms during the rainy season. The Adyomba River leads to Lambarene and is generally free from danger, but it is thinly populated. The Dickelie River runs between the Adyomba and Orongo Uango; it has rapids and is encumbered by rocks. Dickelie Lake is of little depth and choked with weed.

Pilots.—Pilots, especially good ones, for the river are not easily obtained; they are generally found at the factories. As there seems to be no regularly organized system, implicit reliance must not be placed in pilots.

Supplies.—Fresh provisions may be obtained at N'Qola or Lisboa village at the entrance, where there is also a customhouse. Firewood is plentiful at many of the villages on the river.

Trade.—The principal products of the district are ebony, ivory, and india rubber. There is little or no trade at the lower part of the Ogowe, from the mouth to Lambarene. India rubber and a little ivory are exported from Samba, on the N'Gunie River, which is an outlet for the trade of Achango-land. Trade is increasing every year by means of French, British, and German factories.

Inhabitants.—The human population of the Ogowe belong to very different races, certain of which, like the Orungus and Gallois, are fast dying out. Others, like the Kamas and Bakalais stay near the settlements. The Pahuins or M'Fans are gradually absorbing the country. Along the banks of the main waterways passing through it, the villages are all perched on the top of a clay bank, or dwarf hill, behind which the land slopes steeply into what, in the wet season, is a swamp, but these villages are frequently abandoned, and others established under the same or different names.

Seasons.—There are two dry and two wet seasons in the Ogowe district. The long wet season commences in September, and lasts till the end of January, its greatest intensity being in November and December. In February comes the short dry season, then the short wet till May; from May till September is the long dry season. The seasons, however, are not to be depended on for great regularity; the long dry season is fairly worthy of its name, and the long wet also.

Barometer—Thermometer.—The range of the barometer is very small, and does not indicate the approach of bad weather or tornadoes.

The temperature in the dry months is about 72° at night, increasing to about 86° during the day, the nights and mornings being fresh; in the wet season the heat is oppressive, ranging from 80° to 90° .

Apumanda or Fetish Point.—This point is low, with a sandy beach at its extremity, and is the point of separation between Nazareth Bay and Cape Lopez Bay. Off the point, the 3-fathom line extends in a northerly direction to a distance of 7 miles, whence it takes a southwesterly direction, and with an irregular outline continues to the head of Cape Lopez Bay, preserving a distance of about 3 miles from the southeastern shore of the bay.

Near the extremity of the point is Fetish village, but most of the houses are in ruins, the population having abandoned the place and migrated to Sangatanga.

Cape Lopez Bay.—This bay lies between Cape Lopez and Fetish Point, a distance of 18 miles, and runs back in an angular form southward for a distance of 10 miles, the shores of the bay being very low and covered with mangroves.

The head of the bay, into which the Aranga or Lopez, Yombe, and Kondyo Rivers run, is full of shoals, and must be approached very carefully. The western or Cape Lopez side of the bay is the deep-

est, and affords anchorage for 3 or 4 miles, southward of Prince Point, which may be known by its remarkably beautiful group of trees close to the beach.

Landmarks.—In approaching the bay, Cape Lopez, Alongubuna Point, and a clump of trees a little northward of Mandji are easy to make out. The factories, flagstaffs, and the white roofs of the houses at Mandji are conspicuous when approaching the anchorage.

Kondyo mouth.—On the eastern shore of Cape Lopez Bay, about $6\frac{1}{2}$ miles from Fetish Point, is the Kondyo mouth of the Ogowe River, which lies eastward of the Yombe mouth, and is much wider than the latter, but the depth over the flats fronting it is apparently only about 2 feet, as in the Yombe. The stream, though checked by the flood, is stated to be always setting out, but probably this only applies during the rainy seasons.

Yombe mouth is the usual entrance to the Ogowe; vessels drawing 6 feet can enter within one hour of high water at neap tides. In 1904 the only channel was on the northern side, passing the village at 400 yards.

Pavaria (Death) Island.—Off the mouth of the Kondyo River is a small islet, with its shore more elevated than the neighboring low land; on it are some coconut trees.

Cape Lopez.—This point is the southern limit of the Bight of Biafra, and, as before observed, the westernmost point of South Africa. The promontory was originally (1469) named Lopo Gonzalves by the Portuguese. The point is composed of a low sandy beach, covered with mangroves, but from its salient position, it is easy of recognition. It is the northern extremity of a low, wooded island, 28 miles in length north and south, its greatest breadth being 4 miles, and separated from the delta by the mouth of the Aranga or Lopez River, which flows into the head of Cape Lopez Bay. From the northward the cape makes like an island, and the large mangroves which surmount its scrubby vegetation may be seen from a distance of 15 or 16 miles.

It has been observed that from 4 miles southward of the cape to 7 miles northward of it the edge of grayish-green water issuing from the Ogowe is in well-marked contrast to the ocean water; this line is also indicated by tide rips.

Light.—From a white square tower of iron framework, erected on Cape Lopez, at an elevation of 41 feet above high water, is exhibited a fixed white light, visible 12 miles, masked by trees on more westerly bearings. The keeper's house is a good daymark, and is visible when distant 10 miles.

For sectors, see Light List.

Loiret Shoal—Caution.—The former extremity of Cape Lopez is now under water, forming a spit, called Loiret Bank, on which

there is a depth of only 2 fathoms at about 2 miles northward from the lighthouse. It is a matter of difficulty to judge the distance from this point when rounding it, so that a wide berth should be given. Strong eddies and discolored water exist in the neighborhood of the spit.

Prince Bay.—This bay is situated between Prince Point and Cape Lopez, and anchorage will be found close to the head of it, on the edge of the flats off the mouth of the lagoon. During the months of August and September the wind is invariably from the southward, but in October easterly winds sometimes blow.

Caution.—Great care must be taken in approaching this anchorage, as the water shoals very quickly inside 15 fathoms.

Prince Rock.—Off Prince Point a spit runs out in a northeasterly direction for a distance of 5 miles. Prince Rock, with 6 feet on it, is situated at its outer end, which is steep-to, having 10 to 30 fathoms close outside of it. Between Prince Rock and the shore the depths are shallow and irregular, and vessels must pass northward and eastward of Prince Rock. The currents are strong here.

Talisman Bank.—About $1\frac{1}{2}$ miles southeastward of Alongubuna Point, and extending nearly 1 mile from the shore, is Talisman Bank, with a depth of $1\frac{1}{2}$ fathoms; this shoal is steep-to, and vessels have grounded upon the edge of the Talisman bank through skirting its edge too closely.

Shoal.—Halfway between the outer end of the Talisman and Alongubuna Point is a spit extending $1\frac{1}{2}$ miles from the shore, which has only 1 fathom near its outer point, falling suddenly into deep water.

Hound Rock, situated $2\frac{1}{2}$ miles eastward of Mandji, is covered by 9 feet water.

Light.—A fixed white light, elevated 28 feet, visible 9 miles, is shown on the beach near the administrator's house at Mandji. (Reported irregular 1912.)

Anchorage.—Good anchorage may be obtained in Cape Lopez Bay, south of Talisman Bank, in from 7 to 8 fathoms, mud over sand, about 800 yards, eastward of the flagstaff, and Woermann's factory tower 224° ; it can be reached by keeping the tower of Woermann's factory on a 224° bearing, attention being paid to the set of the current. During the tornado season vessels anchor at least 1 mile northeast by east of the settlement. Anchorage, also, may be obtained northward of Talisman Bank in 14 fathoms, mud, with Alongubuna Point bearing 301° , distant about 600 yards.

Good anchorage for small vessels may be obtained in 7 fathoms of water about 500 yards to the eastward of the southern buoy.

In mooring, the anchors should be parallel to the coast.

Beacons.—A wooden beacon, composed of two rectangular panels placed at right angles surmounted by a cask, the whole being white-washed and standing 65 feet high, has been established about 1,200 yards westward of Mandji Light.

A white wooden pyramidal beacon, 8 feet high, has been established on the beach.

These two beacons in line bearing 231° clear the Talisman Bank to southward by 150 yards, and thus mark the northern limit of the anchorage.

Tornadoes may occur in February, March, and April, when they blow from the mainland toward the shore of Mandji Island, and the sea gets up quickly.

Mandji is the settlement in Cape Lopez Bay where the administrator of the Province resides; there are English, French, and German factories, a steam sawmill, and a customhouse with a flagstaff surmounted by a disk to distinguish it from several others. Westward of the administrator's house is a small stream with a bridge over it. This was the first settlement of the Brazza mission. Cape Lopez Bay is an excellent anchorage, and most healthful and cool during July, August, and September; it is a good place for ships to recruit during these months.

An old lighter sunk near the flagstaff of the residency has been converted into a landing stage. The ladder can not be reached at low water.

Tides.—It is high water, full and change, in Cape Lopez Bay, at 4 h. 30 m., the approximate rise at springs being from 4 to 6 feet. At the anchorage in the bay the stream for several days in succession has been found to set out, the force being lessened during the flood. The maximum strength was about 2 miles an hour.

Supplies.—There are no supplies, except game. Vegetables are unobtainable, but fish is abundant and easily obtained by the seine; there are few fishermen. There is very little water.

Communication.—In normal times the vessels of the French Company des Chargeurs Reunis leave Havre on 11th of each month, and those of the Fraissinet Co. leave Marseille every alternate month, and call at Cape Lopez.

Telegraph.—Mandji is connected by telegraph with Libreville; the line crosses the Ogowe at Falaba.

Commerce.—Formerly Sangatanga, Fetish town, and the neighborhood were depots in connection with the slave trade. There are several factories established here now. The articles of commerce consist of ivory, tortoise-shell, wax, dyewood, and ebony; mats also of a superior description are manufactured by the natives.

In the country around, elephants and buffalo may at times be found, while in the numerous streams which intersect the coast are

hippopotami. The natives consider monkeys sacred, and worship them as fetish animals.

Current.—At the distance of from 10 to 20 miles off Cape Lopez the current, during the months of December and January, sets to the southward, but during the other months to the northward, at the rate of from 5 to 50 miles a day.

General remarks—Soundings.—The bank of soundings extending off the coast between Suellaba Point and Cape Lopez, within the 100-fathom line, varies in breadth from 14 to upward of 25 miles. It is narrowest between Capes Two Points and St. John, and becomes much more extensive southward of Cape Esterias. From Gombe Point the coast is moderately steep to as far as the Paps, with depths varying from 5 to 10 fathoms, from 2 miles and upward offshore, whence the depths increase regularly to the edge of soundings, the general nature of the bottom being sand and mud, occasionally intermixed with gravel and shells.

Abreast of the Paps, the approaches to the coast become shallower, and gradually extend in advancing southward, until abreast of Fanaes Islet; the same depths, 5 to 10 fathoms, are found at a distance of $6\frac{1}{2}$ miles offshore. Off Cape Lopez, the limit of the bank of soundings seems to be about 20 miles to the westward, and at 18 miles distance will be found a depth of 38 fathoms.

Caution.—In sailing along this coast, a vessel should not shoal the water under 10 fathoms, nor approach the land nearer than 3 miles, for the coast can only be considered to have been partially examined. Too much dependence should not be placed in the plans of Corisco Bay, the Gabon River, and Cape Lopez Bay, for at these places it may be expected that the sand banks acted upon by the strong ebb from the rivers, and the great ocean currents outside, will shift from time to time.

Surf.—Along the whole extent of coast between Suellaba Point and Cape Lopez, the surf is not always continuous, for northward of Corisco Bay, during fine weather, there is often not a ripple on the beach; and though south of Carisco Bay the surf on the open beaches is heavier, landing is sometimes comparatively easy. The swell, however, will rise, and the surf break, irrespectively of weather, when influenced by the age of the moon, and mostly so for a day or two after full and change.

Winds and seasons.—Along the whole shore of the Bight of Biafra, the prevailing winds are from southwest to south-southeast, varying during the 24 hours, according to the law of land and sea breezes; that is from southwest from 10 a. m. to an advanced hour in the night, and then backing round toward morning, so that in order to take advantage of these periodical variations sailing vessels going southward should arrange their boards accordingly.

This system of navigation will be found to be specially advantageous between the San Benito River and Cape Lopez, for though the breeze during the early morning is from southward, it generally draws round to southwest toward noon in the offing. At this hour it would be better to tack inshore, and if the wind does not change it would be advisable to close the coast and anchor, especially during the months of May and April, the seasons of calms and tornadoes, in order to prevent being set northward by the current.

On the southern side of the bight the winds are off the coast, and nearly always moderate; they as a rule blow from south-southwest, but from June to October, inclusive, they generally blow from southward, when the anchorage within Cape Lopez is smooth.

Tornadoes blow from the eastward, and in the season are frequent, though not so much so as at the Gabon.

Generally it may be said that the seasons, as far south as the Gabon River, are similar to those of the Bight of Benin; but southward of the Gabon the rule for the seasons begins to change, and they partake of the characteristics of the weather south of the equator.

Currents.—The cold waters of the south Atlantic Ocean connecting with the polar currents on approaching the Cape of Good Hope would appear to be joined by that small portion of the Agulhas Current which rounds the cape, and thence as a united stream sets northward and westward along the western shore of South Africa, its direction inshore being influenced by the trend of the coast. This united stream has a tendency to set a vessel toward the coast during and after strong onshore winds, especially in the neighborhood of Dassen Island.

Between the Gabon River and Cape Lopez it is difficult to assign a definite limit to the velocity of the current, as it is so greatly influenced by the direction, strength, and duration of winds. Sometimes, though very rarely, no current is experienced along this coast for several days together.

CHAPTER VII.

FERNANDO PO, PRINCES, SAN THOME, AND ANNOBON. ISLANDS.

General remarks.—The islands in the Bight of Biafra are four in number, and nearly equidistant from each other; the northeastern, inner and largest island is Fernando Po; the two central being Princess and San Thome Islands, while the outer and southwestern isle is known as Annobon. All these islands, as well as the lofty ranges on the mainland, within Fernando Po, are evidently of volcanic origin, and are probably the gigantic results of one and the same submarine upheaval.

It is remarkable that these four islands, the Kamerun, and the Balue (Rombi) Mountains are in line in a northeasterly and southwesterly direction; and this appears to have been the direction of the volcanic disruption, the effects of which may be traced in the irregular features of the ground, marked by abrupt declensions and needle-shaped peaks; while the basaltic and ferruginous rocks of which the islands are composed, the black sand, as well as the scoria which is found along the shores, are all evidences of prodigious force and volcanic agency.

Fernando Po.—This island, which from its size and geographical position is the most important in the Bight of Biafra, lies between the parallels of $3^{\circ} 13'$ north and $3^{\circ} 48'$ north, and the meridians of $8^{\circ} 25'$ east and $8^{\circ} 58'$ east; it is rectangular in form, with a length of 35 miles northeast and southwest, and a mean breadth of 18 miles.

History.—The island was discovered in 1471 by Fernao-do-Poo, a Portuguese noble, after whom it was named; its present appellation, therefore, is a corruption of the proper name. The island is now a Spanish possession, having been exchanged by treaty in 1778 for the Island of Trinidad, off the eastern coast of Brazil.

Mountains.—A ridge of mountains traverses nearly the whole length of the island, and culminates in a magnificent cone, named Clarence Peak, the summit of which, 10,190 feet above the sea, is almost constantly enveloped in clouds. It has been considered doubtful whether the peak can yet be considered extinct, as smoke is said to be occasionally seen, but the highest parts, composed of volcanic scoria, have been so decomposed as to be covered with a grassy vegetation. There are also two smaller peaks near the southwestern ex-

tremity of the island, but of diminutive height when compared with their stupendous neighbor.

Aspect.—When seen from seaward, the island of Fernando Po presents a beautiful appearance. Clarence Peak is visible from the westward on a clear day, or after a tornado, from a distance of 100 miles, but generally the weather is so hazy as to prevent its being seen beyond a short distance. The channel separating Fernando Po from the base of the Kamerun Mountain on the mainland is 19 miles across, and from about mid-channel the appearance of the magnificent mountain masses on either side is most grand and impressive.

Population.—The natives of Fernando Po belong to the Adeeya Tribe, but are known to Europeans as the Boobees, from their word of salutation, signifying stranger. They are a peculiar race, and differ in their physical characteristics and language from their continental neighbors, though they retain, in a modified degree, the superstitious prejudices and debasing customs which characterize the natives of the mainland.

Although of an unprepossessing appearance and warlike among themselves, they are said to be friendly, hospitable, and forbearing to white men, while in physical conformation they are, as a rule, well made and muscular.

Their skin, which is of a brownish-black color, is frequently daubed over with red or yellow ochre, and with the exception of a few tufts of dried grass over the middle, both sexes appear in a state of nudity, having for ornaments necklaces of beads, chicken bones, shells, and other rude ornaments of savage life. Their habitations are extremely primitive, being composed of four uprights, covered with a coarse matting of plain leaves, and of 15 or 20 such sheds are their towns composed, the sites being the bare crests of the midland slopes.

The population of Fernando Po in 1910 was about 20,000, of whom about 250 are Europeans.

Products.—The forests of Fernando Po produce a great variety of trees, of which many are very valuable for shipbuilding and commercial purposes. Among others, besides the palm, are the ebony, African oak, *lignum-vitæ*, yellow logwood, and many species of mahogany. The trees near the seashore, consisting chiefly of palms and the magnificent bombax or silk cotton trees, frequently resemble the white sails of vessels. Many of these trees attain gigantic heights, and measure 150 feet from the base to the first branch, and during the dry seasons are ornamented by festoons of beautiful climbing plants pendent from the branches.

The climate and soil are said to be suitable for the cultivation of rubber. Trees of the Para species and others have been planted.

The sugar cane grows wild and in great abundance; yams also are produced in great quantities and are esteemed the finest in Africa; they form the principal article of food of the inhabitants. There are numerous streams in the island, and the water is described as being remarkably pure; but they are much infested with alligators, and are consequently dangerous to bathe in.

Rainfall.—The rainfall during 1909 was 97.5 inches, the driest month being April (3.7 inches) and the wettest September (15.8 inches). In 1908 the rainfall was 84 inches.

Supplies.—The island is resorted to by palm-oil vessels to obtain supplies of wood and water. Stock, however, excepting yams, is neither abundant nor cheap. Green pigeons are said to be plentiful, and may be shot by going a short distance into the bush and waiting for their settling on the branches of the high trees.

Exports.—In 1908 the principal exports were cocoa, palm oil, kernels, rubber, gum, etc. In this year 2,814 tons of cocoa were exported to Spain.

Imports.—The principal imports during the same year were cotton goods, tobacco, kerosene, wine, and provisions.

Cape Bullen, Punta de los Frailes, the northern extremity of Fernando Po, is a salient point of moderate elevation, surmounted by a large number of remarkable trees of great height. Around its base are numerous rocks close inshore, most of them being above water.

The coast.—From Cape Bullen the coast of the northeastern side of the island trends about 1 mile in a southeasterly and 2 miles in a southwesterly direction, after which it is almost straight as far as Cape Horatio, the northeastern point, a distance of 13 miles; but it is indented by a number of small bays and coves. During August the sperm whale and turtle are to be seen in the offing between Fernanda Point and Cape Bullen.

Maidstone Bay extends eastward from Cape Bullen for a distance of 5 miles as far as Fernanda or William Point, its bight from a line between the above points being nearly 2 miles. The soundings gradually decrease from a depth of 24 fathoms to the shore.

Gravina Bay.—This bay, or more properly roadstead, is one of three comprised within the limits of Maidstone Bay, and lies close to the westward of Pilon Point, and by many is preferred as an anchorage to Port Clarence.

Anchorage.—Maidstone Bay is the best place of anchorage in the island, but vessels intending to remain at Fernando Po for some time will do well to anchor in Gravina Bay, as far from the shore as convenient, as it will be cooler than if closer in, and the ship will be free from mosquitoes. A good berth will be found about $\frac{1}{2}$ mile offshore in a depth of 17 fathoms. An inshore berth is especially undesirable

in the tornado season, for they frequently blow directly toward the land.

Venus Bay or Cockburn Cove lies close eastward of Gravina Bay; it is about 800 yards across between Pilon Point and Christiana Point, the latter being $\frac{1}{2}$ mile southwestward of Fernanda Point. At the head of the cove is Cockburn Brook, a running stream which flows into the sea through a sandy beach, from which water can be easily obtained by ship's boats.

The shores of the cove are on the whole high, rocky, and steep, and are fringed with rocks above and below water. Off Pilon Point the 3-fathom line extends nearly 200 yards, with only 3 feet close inside it; and off Christina Point to 100 yards, while in the bay will be found the depths of 7 to 9 fathoms. Near the extremity of Christina Point, on its eastern and western sides, are Jacob's ladders or staircases, for ascending to the summit of the point, which is high and wooded.

Enrique or Adelaide Islets consist of three large rocks, 40 to 45 feet in height, which are connected at low water, and extend about 300 yards in an east and west direction. The eastern and largest of the group lies 200 yards northward from Christina Point. There is a channel with 5 to 8 fathoms in it between it and the point.

Shoal water extends eastward of the eastern islet, with only 1 fathom at nearly 200 yards distant, outside of which it quickly deepens to 10 fathoms. A shoal with $1\frac{1}{4}$ fathoms on its extremity extends nearly 200 yards westward of the western islet. Northward of the islets shoal water extends for about 100 yards.

Fernanda or William Point is the northern extremity of a rocky peninsula, about 70 yards broad, projecting about 600 yards in a northwesterly direction. It takes the form of a curve, with its concavity facing the west, which is continued under water by a shoal, with several patches of 4 feet, the extremity of which as defined by the 3-fathom line lies 300 yards westward of the point.

Light.—A fixed light, elevated 111 feet above high water, is exhibited from an iron post near the extremity of Fernanda Point; it shows white over the anchorage, and red in other directions; the white light is visible 15 miles and red 8 miles. Near the light support there is a small white house with a red roof, which can be seen at some distance.

Santa Isabel Bay (Port Clarence).—This bay or cove, on the eastern side of Maidstone Bay, is formed between Christina Point, Enrique Islets, and Fernanda Point. From its circular form and the nature of its shores, the bay is evidently the crater of an extinct volcano. The shores are composed of steep rocky cliffs, from 100 to 200 feet high.

Harbor lights.—From a small pillar, 27 feet high, and painted in black and white bands, erected on the scarp fronting the southwestern angle of the hospital, a fixed green light of low power is exhibited. From a similar pillar on the mole another fixed green light is exhibited. These lights, the exact positions of which appear to be uncertain, when in line 127° lead through the center of the channel into the anchorage, but are only shown when a Spanish steamer is expected.

A small white light is exhibited from the end of the pier.

Buoys.—A conical buoy, painted red, is moored in a depth of $3\frac{1}{2}$ fathoms on the edge of the shoal extending eastward from Enrique Islets; and a similar buoy, also painted red, in the same depth, marks the western extremity of the spit projecting from Fernanda Point. The position and description of these buoys must not be depended on.

Tides.—It is high water, full and change, at Port Clarence, at 4 h.; rise at springs, 7 feet.

Current.—Along the northern shore of the island, the general trend of the stream is eastward, with a variable velocity, but it often runs at the rate of $1\frac{1}{2}$ miles an hour. It should be particularly guarded against when approaching Port Clarence at night.

The entrance is between the shoals extending from Fernanda Point on the eastern side and those extending from Enrique Islets on the western side; this channel between the 5-fathom curves is about 300 yards wide, with a depth of 13 fathoms in it.

Landmarks.—The hospital and church, both standing near the edge of the cliff, are conspicuous; the former has a large zinc roof. The church is white, and has a sharp spire, with a clockface that is lighted up at night; it can often be seen at a greater distance than the leading lights. Government house has a flagstaff.

Anchorage.—As a harbor, Port Clarence is perfectly safe (even from tornadoes as a rule), and affords good anchorage in from 9 to 14 fathoms, mud; while the smooth water, and rise of 7 feet, admit of small vessels being beached for repairs without danger; but the high cliffs, by excluding the breeze, render the anchorage hot and unhealthful.

The town, the ascent to which is made by staircases, is small, and stands on a plateau on the southern side of the port, and principally consists of a few good houses belonging to merchants connected with the trade in the oil rivers, but European and native houses are intermingled, and built without reference to the prevailing winds. At Basile, situated on the mountain side 6 miles from the town, and connected with a good road and a tram line for three-quarters of the distance, the conditions are better.

There is a substantial iron pier situated beneath the hospital.

Radio.—A radio station, open to the public at all times, communicates with Duala. Call letters, E A Y.

The inhabitants consist principally of Africans liberated by the British cruisers, and their descendants, who were formerly part of the British establishment; they now cultivate fruit and vegetables, and raise goats, pigs, and poultry; these, with yams, form the principal supplies of the island.

Water.—A spring of fresh water rushes over the rocks at the base of the cliffs which form the southern side of the cove, and around it a wooden house has been erected. Near it is a Jacob's ladder leading to the plateau above. From this spring ships obtain fresh water, the best time being after half ebb. The water, however, sometimes fails, when it must be obtained from Nervion (Goderich) Bay.

Coal.—The coaling depot for naval vessels and the African mail steamers is in Santa Isabel Bay; the sheds are at the foot of the cliff immediately under the church. About 75 tons of coal are usually kept in stock, but coaling is now exceedingly slow, as there is only one small lighter of 7 tons' capacity and two surfboats available. The weather does not interrupt coaling.

Communication.—In normal times the Elder, Dempster & Co.'s steamers from Liverpool call outward and homeward; Spanish steamers from Cadiz twice a month. There is also a monthly service to Corisco Bay.

Directions.—There is frequently a difficulty in identifying the land about Santa Isabel Bay (Port Clarence) from the offing, in consequence of the shore being masked by the high land around, and this is particularly the case with Enrique or Adelaide Islets. The entrance to the cove lies between Fernanda or William Point and Adelaide Islets, but the actual channel is narrowed by shoals on both sides. Having recognized Fernanda Point and Adelaide Islets from seaward, steer for Fernanda Point until the church, hospital, or pier can be seen, or the small pillars painted in black and white bands are made out; the latter in line 127° lead about midway between the buoys marking the shoals on either side, and up to an anchorage, which may be taken up as convenient. The buoys should not be depended on.

By night the fixed green light shown from the small pillar at the southwestern angle of the hospital in line with the fixed green light from a similar pillar bearing 127° , is the line for entering, but these lights are only exhibited when the Spanish mail is expected.

It would not be prudent to attempt entering the port at night under sail, as the channel is narrow, and there are no dependable leading marks; in such a case the best anchorage outside is in about 20 fathoms, with Fernanda Point Light bearing 111° . The wind will almost always admit of a vessel entering; the best time for leav-

ing is after dark, when the wind is mostly from the southward. The passage inside Adelaide Islets has been recommended, especially when many vessels are at anchor in the port, as it enables a suitable berth to be selected, but it is scarcely available for large vessels.

Nervion or Goderich Bay.—Eastward of Fernanda Point the land falls back into a shallow bay, the eastern boundary of which, Bottlenose Point, lies nearly 1 mile east by south from Fernanda Point. The coast line of Goderich Bay is broken up into a series of indentations, the principal of which is Horton Cove.

Consul River or Hay Brook is a small serpentine stream which flows through a valley on the eastern side of Santa Isabel Plateau and falls into the sea in a small bight on the western side of Goedrich Bay.

Horton Cove lies eastward of Hay Brook, being separated by Goderich or Amirante Point, which is low and rounded. The cove has a sandy beach at its head, through which the Horton or Nicolas Brook, a small stream similar in character to Hay Brook, falls into the sea. A quarter of a mile from the entrance, on the left bank of the brook, is a waterfall 50 feet high. At the entrance of the cove there is a depth of 5 fathoms, diminishing toward the shore.

Bottlenose Point.—Between Horton Cove and Bottlenose Point are several other small indentations, unnecessary to describe in detail. Bottlenose Point, from which a shoal extends for 100 yards, is remarkable, by having a large tree on its extremity.

The coast.—From Fernanda Point the coast trends in an easterly direction for $8\frac{1}{2}$ miles to Cape Horatio, and throughout the whole of this distance the shore is rocky, and indented at intervals by numerous small coves. The coast is well wooded and without any known off-lying dangers; it is also steep close-to, and within 1 mile of the shore there are depths of 26 and 28 fathoms. Vessels sometimes anchor along shore about 3 or 4 miles eastward of Fernanda Point, but toward Cape Horatio the water becomes deeper, and tornadoes blow heavily along the coast, though not long enough for much sea to get up.

Cape Horatio (Punta Hermosa), the northeastern point of Fernando Po, is a round, sloping, wooded point, with hills rising close behind it. It is rocky at its base, and steep-to, with some rocks close inshore.

Horatio Island lies a short distance off Cape Horatio, and shows distinctly as an island when rounding the cape at about 2 miles distant.

Caution.—There are no off-lying dangers at Cape Horatio, but at night vessels should be careful in passing either this point or Cape Bullen, for the water is too deep for the lead to be any guide, and the high land is very deceptive.

The coast.—From Cape Horatio the coast takes a general southerly trend for a distance of 7 miles to Cape Vidal, and thence continues almost in a straight line to the southwestward as far as Cape Barrow, the southern point of the island. The whole of this extent of coastline is abrupt and greatly indented, forming a succession of points and coves, fringed with rocks close inshore.

This side of the island is but little frequented, in consequence of there being no good anchorages, and thus a ship caught in a tornado, without a place of refuge, and unable to run, would be placed in a position of great danger.

Cape Vidal is the easternmost point of Fernando Po, and has, according to the chart, some sunken rocks off it.

Leven Island, 12 miles southward of Cape Vidal, is of small extent and moderate elevation, and is only a short $\frac{1}{2}$ mile from the coast of Fernando Po, with which it is confounded when viewed from the eastward. A depth of 30 fathoms will be found within 1 mile of the island.

Melville Bay.—Southward of Leven Island is a cove where there is a factory, the cove studded with rocks and small islets; and 3 miles farther southward is Melville Bay, which is about 3 miles across and $1\frac{1}{2}$ miles to its head. The bay is quite exposed to easterly winds, which blow with great violence during the tornado season, and the bank of soundings is very narrow off this part of the coast.

Cape Barrow (Punta da Santiago), the southern extremity of Fernando Po, is a high, rocky point, surmounted by Burn Peak, 1,432 feet high, about $1\frac{1}{2}$ miles northward of it; the cape is very wooded above the cliffs which form the coast line, and around its base are some rocks and breakers.

The coast.—From Cape Barrow to Cape Badgley the southwestern extremity of the island, the distance is 21 miles in a northwesterly direction, the character of the coast being the same as that already described. This part of the island is also but little frequented, as the shallow indentations offer no shelter whatever from the winds ranging between southeast and southwest, which sometimes create a heavy sea.

Mountains.—Along this coast the land rises very rapidly; Saddle Hills are two peaks of about 1,348 feet high, which overlook the central portion of the coast. At $5\frac{1}{2}$ miles inland at this part the mountains attain a height of 6,889 feet.

Cape Eden is the most projecting point on this coast, and has waterfalls in its vicinity.

Cape Badgley (Punta da Sagre) is high, bluff, and wooded, with deep water close-to, and from it the western coast of the island trends nearly at right angles to the southern coast.

San Carlos or George Bay.—At the distance of $8\frac{1}{2}$ miles north-eastward of Cape Badgley is the rounded point of San Carlos, or Charles Folly, the western point of San Carlos or George Bay. The bay is a deep indentation about 6 miles across between the above point and Cabras (Kelly Point) to the northeastward. The southern shore of the bay, of moderate height and much indented, takes an easterly trend for about 5 miles, and thence sweeps around with a low, wooded, sandy shore to Cabras Point. The sandy shore is fringed here and there by reefs, and numerous streams flow through it in various places, whence pure fresh water may be procured.

Light.—A fixed green lantern light, elevated 72 feet above high water, and visible 10 miles, is exhibited from an iron framework support, 21 feet high, surmounting a small house in the town of San Carlos.

Marwood River.—The principal of the above streams is known as Marwood River, about 2 miles southward of Cabras Point.

Cabras Point is rocky, steep-to, and rises gently to a hill of moderate elevation at the distance of $1\frac{1}{2}$ miles inland.

Cabras (Goat) and Kid Islands.—At the distance of $1\frac{1}{2}$ miles northward of Cabras Point is Cabras Island, about $\frac{1}{4}$ mile in extent and of moderate height. About 600 yards inshore is Kid Island, smaller in size; about 600 yards farther on in the same direction is a low rock, surrounded with breakers. The coast abreast these islands falls back into a bay, with a sandy beach, broken here and there by rocks. Cabras and Kid Islands afford convenient shelter, and anchorage may be obtained on their southeastern side about 800 yards off; this locality, however, appears to have been but imperfectly surveyed.

Anchorage.—San Carlos Bay as an anchorage is preferred to Port Clarence, as it is commodious and can be entered with facility; it is also without offlying dangers and is well sheltered from all the prevailing winds, excepting the squalls from the highlands. The best anchorage is in from 16 to 20 fathoms, with Cabras (Goat) Island in line with Cabras Point, and San Carlos Point about 256° . Small vessels can go nearer in south of the watering place.

Supplies.—Vessels anchoring in San Carlos Bay generally fire one or two guns as a signal to the natives who, in exchange for muskets, knives, and any sort of iron, bring off goats, pigs, poultry, and yams. The bay is a good place to haul the seine, as mullet, bream, and other kinds of fish, as well as turtle, are plentiful.

Water.—Marwood River watering place, where a plentiful supply of spring water can be obtained, is convenient, and firewood abundant.

Tides.—It is high water, full and change, in San Carlos Bay at 4h.; rise of tide at springs, 7 feet.

Directions.—When the island of Fernando Po is first seen, it makes like two peaks, the easternmost and highest being Clarence Peak, and the westernmost, also very high, with a rounded summit, sloping gradually to the sea.

Steamers from the westward bound to San Carlos Bay will experience no difficulties, but sailing vessels should endeavor to make the southwestern end of the island, for, in consequence of a strong northeasterly current and baffling winds, a ship, if once to leeward, would find it difficult to recover lost ground.

Should the latter vessel be so far to leeward as to have Clarence Peak bearing 88° , she should tack and close San Carlos Point, and then, keeping an offing of 1 or 2 miles, run along the south shore and anchor as before described.

The coast.—From Cabras Point the coast is almost exclusively composed of rocky cliffs, with numerous indentations as far as Cape Bullen; none of these have been surveyed, but the largest is just immediately northeastward of Boteler Point, which is distant from Cape Bullen 10 miles in a southwesterly direction.

Boteler Rocks.—The only known detached danger off this part of the coast is a reef, on which two rocks appear, known as Boteler Rocks. These rocks lie $1\frac{1}{2}$ miles offshore, with 14 to 20 fathoms between; they are $3\frac{1}{2}$ miles 220° from Boteler Point and 5 miles 9° from Cabras Island. This danger is about 1,200 yards in length north-northeast and south-southwest, but very narrow and is steep-to all around.

Boteler Point—Shoal.—A rocky shoal, about $\frac{3}{4}$ mile in extent, with $5\frac{1}{2}$ fathoms over it and 16 fathoms around, lies 223° from Cape Prior and about 1 mile off Boteler Point.

Seasons and winds.—The seasons and climate at Fernando Po are generally the same as those experienced in the Bight of Benin, with perhaps more rain, caused by the very high land. Land and sea breezes prevail throughout the greater part of the year; the tornadoes, which are frequent and heavy, blow generally from the eastward, but they have been known to blow from north-northwest, when the anchorage in Maidstone and San Carlos Bays would be on a lee shore. Unfortunately, the island is very unhealthy, especially during the rainy season, which commences about the latter end of May or beginning of June and terminates about the middle or end of November.

The best months are those in which the harmattan prevails, when, the rainy season being over, the atmosphere is cleared of the miasma engendered by humidity. It blows principally during December, January, and February, but is not continuous nor does it blow with

much force. It is replaced after the last-named month by breezes from southwest to west-southwest, which lessen the burning heat and oppressive dryness experienced during the continuance of the harmattan.

Haze.—The weather is often so thick and hazy that the land can not be seen, and as the easterly current is strong, vessels might run past the island. Approaching from Cape Formoso, therefore, under these circumstances, the frequent use of the deep-sea lead is absolutely necessary.

Currents.—The currents around Fernando Po are very variable, and require closer observation. The Guinea Current which is so continuous and rapid toward the Bight of Biafra impinges on the shores of Fernando Po, and the island is therefore to a certain extent within its influence.

Generally speaking, during the winter months the current appears to set to the northward on the west coast, to the eastward on the south coast, and to the southward on the east coast, at the rate of from 1 to 2 knots an hour; during the summer it appears to set to the northward on the east and west coasts and to the westward on the south coast. They are, however, variable in this locality and can not be depended on.

Princes Island.—This island, which lies 120 miles northwestward from Cape St. John, the nearest part of the coast of Africa, and 116 miles southwestward of Fernando Po, is in its physical features and aspect one of the most remarkable in the world.

The island lies between the parallels of $1^{\circ} 42'$ and $1^{\circ} 32'$ north latitude, and the meridians of $7^{\circ} 20'$ and $7^{\circ} 28'$ east longitude. It is 9 miles in length north and south, with an average breadth of 4 miles, and is a possession of the Portuguese, by whom it was discovered in 1471. The name of *Ilha do Principe* (Princes Island) was conferred on it about the year 1500, when the revenues from sugar were granted to the heir of the Crown of Portugal.

The general aspect of Princes Island, though resembling in some respects that of Fernando Po, is more singular in outline from the needle-shaped peaks and leaning mountain masses which rise abruptly from the high land of the interior, thus imparting a most picturesque appearance; but as the island is subject to much rain, and the soil is exceedingly prolific, the luxuriant vegetation which everywhere abounds becomes rank to such a degree as to cause the island to be unhealthful. In many parts there are traces of extinct volcanoes, and large spaces are covered with volcanic stones, which serve for building purposes.

The northern part of the island, though high, is tame compared with the southern portion, which consists of a series of steep and rugged mountains, surrounded by gigantic natural obelisks of most

fantastic shapes, the whole culminating in a peak 3,050 feet above the sea, which may be seen in clear weather from a distance of 60 miles.

Soundings.—The 100-fathom line to the northward as well as to the eastward apparently runs off, about 3 miles, but southwestward of the island it extends upward of 12 miles, including near its southern limit the two islets known as Great and Little Brothers.

Supplies.—The water here is excellent, and easily obtainable in any quantity. Firewood is also plentiful, but the dark-colored, of great specific gravity, is to be preferred. Beef may be obtained at San Antonio and West Bay, and occasionally pigs and poultry, but not in large quantities. Fruits and vegetables of all kinds are grown, but yams and sweet potatoes are scarce; in the forests are many valuable and useful woods.

Climate.—The climate, like that of the Gabon River, is very hot and humid, but not so much so as on the Continent, for the temperature is sensibly diminished by the sea breezes. There are but two seasons—that of the tornadoes, from March to September, the pleasantest part of the year, and the rainy season, from the end of September to March, during which period also violent storms are of frequent occurrence. The dry months are July and August, which is also the period of the southwest breezes.

Population.—Nearly the whole of the inhabitants reside in the town of San Antonio, situated at the head of a bay on the east side of the island, for scarcely any other place merits the name of a village; and thus, with only one town, the island has no internal trade. Neither are there any practicable roads beyond the high peak and that of Papagayo, and even up to these they are rather tracks than paths.

In 1900 the population of Princes Island numbered about 4,327.

The men of the better class are well educated, courteous, and hospitable, speaking and writing Portuguese; and some of them are acquainted with other European languages. The lower orders are rude, superstitious, and indolent.

Bombom Island is in reality the extreme northern point of Princes Island, being connected with the mainland by a sandy spit, on the western side of which are two small rocky islets. The so-called island is of good elevation, very wooded, of a rounded form, and steep-to on its seaward face, against which the sea frequently breaks.

Between Bombom Island and Burras Point, a little more than 2 miles in a east-southeasterly direction, the land falls back into a bay of irregular outline and is well wooded close to the shore, which is principally composed of rock, with here and there small sandy bights between the points of rock. Fish is abundant all along this coast.

Pedra da Galle.—About 2 miles north-northwestward of Bombom Island is a small, bare, black rock of basaltic formation, on which the sea always breaks; and as it is very steep-to and only 9 feet high, it is very dangerous at night. The depths in the passage between the rock and the mainland of Princes Island vary from 10 to 17 fathoms, and the channel is free from any known dangers.

Burras Point is high, rocky, and steep-to; it falls on its inshore side to a low neck, and this from a distance causes the point to assume the appearance of being detached. On the hills which skirt the coast within the point are some native huts, which are partially hidden among the foliage, and immediately eastward of the point is a small sandy bay.

Anchorage.—There is good anchorage in the bay between Bombom Island and Burras Point, in about 8 or 9 fathoms, mud and gravel.

Mosteiro Islet.—From Burras Point the shore trends southeastward for $1\frac{1}{2}$ miles to Mosteiro Point, forming the eastern extremity of Princes Island, and around which the sea often breaks heavily. Close to the point is a black rock known as Santa Anna Islet, and beyond, at the distance of $\frac{1}{2}$ mile is a group of bare rocks connected by a shoal bank with the point.

The largest of these rocks is known as Mosteiro Islet, with from $4\frac{1}{2}$ to 5 fathoms water around it, and within the islet in a westerly direction from its north end, are two small rocks above water; there is a rock with less than 6 feet over it and other rocks with 2 fathoms water, on which the sea breaks, between Mosteiro Islet and the northern end of Santa Anna Islet.

Diamond Rock.—About 200 yards southeastward of Mosteiro Islet, is the Diamond Rock, a small low rock showing above water, fringed by several sunken rocks, on which the sea breaks heavily. This rock should not be rounded on its eastern side nearer than 800 yards, when the depth will be about 30 fathoms; the current sometimes sets strongly toward this rock.

Cabras Bay.—Between Mosteiro Point and Capitan Point, distant about 1,400 yards to the southward, the shore, which is rocky and fringed with breakers, falls back into Cabras Bay, which is shallow and rocky.

San Antonio Bay.—This bay, the most important in Princes Island, is comprised between Captain Point and Garça Point, a distance of $2\frac{1}{2}$ miles 177° , and within this boundary line the bay runs back in a westerly direction $2\frac{1}{2}$ miles to an inner bight, which is not easily recognized from seaward, and at the head of this bight stands the town of San Antonio. The shores of the bay are rocky, and between the points are numerous sandy coves.

The great drawback of San Antonio Bay is its being exposed to easterly and southeasterly winds, from which quarters the tornadoes blow; but the holding ground is such that vessels may remain at anchor in safety, providing their ground tackle be good.

Northern shore—Formiga Bay.—Capitan Point, which is steep-to, is a narrow tongue of land, and not only forms the northern point of San Antonio Bay, but the eastern point of a small bay known as Praya Formiga, which is about 1,600 yards across at the entrance and 1,200 yards to a good sandy beach at its head, through the western part of which runs a small stream. This bay is terminated on its western side by Santa Anna Point, high and wooded, but faced on its extremity by low cliffs.

The depths in the bay vary from 6 to 7 fathoms, with 4 fathoms close to the beach, on which there is frequently a surf. As the bottom is composed of coral and shells, and the bay is open to the southeast, it would be imprudent to anchor here during the tornado season.

Roques Island.—About 600 yards eastward of Santa Anna Point, is Roques Island, 65 feet high and covered with brushwood. Between the island and the mainland there is a boat passage, but as the sea almost invariably breaks on the shore of the island and around the point, landing is impracticable.

The coast.—From Santa Anna Point the northern shore of the bay trends westward, and for the space of $\frac{1}{2}$ mile is composed of rocky cliffs, above which the land rises abruptly, and is wooded. Thence the coast as far as the town continues high and wooded, with numerous rocky points and small sandy caves between, where landing may be effected.

There are two large houses northward of the town, the first being Casa-Ferreira and the other Casa-Gaetano, the latter being the residence of the governor.

A shoal, about 300 yards in extent north and south, with a least depth of $2\frac{3}{4}$ fathoms on its northern end, situated 900 yards 358° from Fort da Mina Light, and 4 to 5 fathoms around, lies in the anchorage of San Antonio Bay.

Southern shore—Garça Point.—Garça Point is a rounded, rocky headland forming the south point of San Antonio Bay; about 400 yards northward is Anzol Point, off which a rocky spur extends.

Light.—A fixed white light, elevated 115 feet above high water, visible 12 miles, is exhibited from an iron frame, standing on the roof of a small house with gray walls on Garçia Point.

Salgada Bay.—Salgada Bay is about 600 yards broad, and the same distance to its head. The shores of the bay, which is bounded southward by Bado Point, and on the northward by Martha Point, consists of two sandy beaches, separated by a rocky cliff. Close to the beaches at each angle of the bay is a large house and a chapel

surrounded by huts. The depths in the bay vary from $3\frac{3}{4}$ fathoms at the entrance to $2\frac{1}{4}$ fathoms near its head; the bottom is composed of sand and coral.

The telegraph cable from Bonny and San Thome is landed in the northwestern part of the bay; anchoring off or in this bay should therefore be avoided.

From Martha Point, which is moderately steep-to, the coast trends northwestward for 600 yards to Risco Point, and is rocky, high, and wooded.

Risco Point, the eastern point of Pequeña Bay, is rocky and steep, and the land within it rises to a small conical hill of 410 feet that is well wooded. Off the point are some projecting and covered rocks extending to a distance of 100 yards, upon which the sea sometimes breaks.

Pequeña Bay.—From Risco Point the land trends northwestward as far as Ponta da Mina, the shore between being high and wooded, with a sandy beach broken by several rocky points. Westward of Risco Point is Pequeña Bay, with a sandy beach, near the middle of which is a large house, with a small stream of pure fresh water. Balea Bay is the next bay northward.

Da Mina Rock, with $2\frac{1}{2}$ fathoms water over it, lies 108° 800 yards from Fort da Mina, and has from $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms around it. The house of San Joao in line with the southeastern extremity of Ponta da Mina, 256° , leads northward of the rock.

Ponta da Mina.—Ponta da Mina, which is surrounded by rocks to the extent of 100 yards, is a prominent point about 1,600 yards westward of Risco Point. On the summit of the point stands Fort da Mina (which contains only a few old bronze guns of the seventeenth century, unmounted) forms the front garden of Government house. The landing is at the foot of the cliff, on the beach, whence a path leads up by zigzags.

Light.—From an openwork iron structure 26 feet in height, near Fort Ponta da Mina, a fixed red light is shown at an elevation of 176 feet above the sea, visible 5 miles. The light structure is within the fort about 15 yards eastward of the flagstaff. For sectors, see Light Lists.

Town.—The town of San Antonio stands on a low marshy plain between the Frados River to the northwestward and Papagayo River to the southeastward, and is sometimes inundated by the sea. It is sheltered by high wooded hills, and is so damp as to necessitate building the houses on piles, the lower or basement story being assigned to domestic animals. The town is tolerably regular, and has six churches, all in ruins; the houses, which are constructed of wood, are often in a state of decay, and have a wretched appearance.

The salubrity of the place may be judged of by its position, in a hot and humid climate. A detachment of native troops are stationed here.

Pier.—Boats can go comfortably to the pier at the northern side of the entrance to the Frados River, which is the only pier shown on plan, and is not far from Casa Ferreira. A red light is shown from a lamp-post at the end of the pier.

Supplies.—Fish may be caught with the seine. They are abundant on the southern side of the bay seaward of Ponta da Mina.

Provisions are not immediately procurable, although oxen, sheep, pigs, etc., and vegetables might possibly be obtained, if the stay was sufficiently long to give notice to the neighboring estates.

Water.—From the Papagayo River, the southern shore of San Antonio Bay takes an easterly trend, and presents the same appearance as the northern side. About 800 yards from the town is a running stream of good water, and near it, above Guarda Point, to the eastward is a large house named San João; while another stream, admirably adapted for watering, lies a short $\frac{1}{2}$ mile farther on. In the dry season these streams are not accessible from the sea, in consequence of the sandy beach being higher than the stream level; and as a rule, in order to obtain pure water, it is best to obtain supplies when the tide is low.

Communication.—Portuguese vessels of the Empresa Nacional Line, leaving Lisbon twice a month, call here outward and homeward.

Telegraph.—A submarine cable connects Princes Island with Bonny and San Thome Island; it is landed in the northwestern part of Salgada Bay.

Tides.—It is high water, full and change, in San Antonio Bay at 3 h. 58 m.; springs rise 3 feet, neaps $1\frac{1}{2}$ feet. The rise and fall are very regular, but the tidal stream, which does not attain any great velocity either during flood or ebb, is more uncertain.

Anchorage.—There is good anchorage outside the line between Santa Anna and da Mina Points, in from $5\frac{1}{2}$ to 10 fathoms water, but care must be taken not to let go the anchor on rock. There is anchorage in 6 to 7 fathoms, good holding ground, with the Fort da Mina bearing 206° , distant 1,000 yards. An inner and less exposed anchorage for small vessels within the isolated $2\frac{3}{4}$ -fathom shoal, is in $4\frac{1}{2}$ fathoms, mud, with the Fort da Mina bearing 163° , distant 800 yards, and the south end of Roques Island 57° . Here the ground is of a stiff tenacious clay, and though exposed to tornadoes, accidents to shipping rarely occur.

Directions.—The following directions are written for sailing vessels, but steamers can adapt them to suit their requirements with constant reference to the chart.

When approaching Princes Island under sail, it is generally considered advisable to do so from the southward, to avoid being set to leeward by the currents, which almost invariably, in the vicinity of the island, set north and north-northeast from 1 to $1\frac{1}{2}$ miles an hour. This precaution is especially necessary if making for West Bay, but if bound for San Antonio Bay, although the southern route is preferable, a vessel may pass either north or south of the island, for the anchorage can always be reached even from the northward without difficulty.

At the distance of about 20 miles westward of the island, a large number of seamews and other aquatic birds are generally fallen in with, and this fact may prove useful during hazy weather, or at night time, for the birds, on being disturbed from their rest on the surface of the water by the progress of the ship, rise and give utterance to plaintive cries.

If intending to round the northern end of the island, Pedra da Galle may be passed on either side, but when on the meridian of Burras Point, calms are often experienced, and advantage must be taken of occasional squalls to reach the meridian of the Diamond Rock, where the usual breeze from the southward to southwestward may be expected; after making a good board to the southeastward, stand in for the bay, which is, however, often rendered difficult of access on account of calms and squalls.

When rounding the island to the southward avoid if possible passing between Pico-negro Point and Carocha Island, where the winds are baffling and currents variable; but stand on well to the eastward until past the meridian of Garça point before bearing up to the northward, in order to avoid being becalmed too close to the shore. When off the bay, in case of calms, it may be necessary to anchor in order to avoid being set to the northward. As the winds in the vicinity of the bay are generally between south and west, a vessel must beat in, and in doing so it is necessary to keep on the southern shore, as both swell and current set to the northward.

Broad Bay.—From Garça Point the coast falls back into a bay, terminating southward in Ponta de Mai, which is distant from the former point $4\frac{1}{2}$ miles in a southwesterly direction.

Between the points forming the boundaries of Broad Bay, the coast is composed of high rocky cliffs, many of which show red patches. A little northward of Ponta da Mai is the point of junction of the two mountain ranges which cross the island; their fall southward is very sudden, and the land rises abruptly from the borders of the sea.

Ponta da Mai is steep close-to, but about 1 mile northeastward a cluster of rocks extends $\frac{1}{2}$ mile offshore.

Praya Grande.—Within Ponta da Mai to the westward is a small bay with a sandy beach, known as Praya Grande, and beyond

this the coast always high and rugged extends to Pico-negro Point.

Pico-negro Point.—The extreme southern point of the island, which is a long tongue of land with abrupt cliffs on all sides, and off its extremity is a sunken rock which usually breaks.

Carocha Island.—At the distance of $1\frac{1}{2}$ miles southeastward of Pico-negro Point is a steep rocky island, about $\frac{1}{2}$ mile in length, and 1,037 feet high, covered with trees and brushwood. The island from its peculiar form is known as Carocha (Mitre) Island, and by the English has been named the Dutchmans Cap. Seen from the southward, it makes like a part of Princes Island; it is very steep-to, and in the channel between, which is clear of danger, the depths are from 25 to 30 fathoms, fine black sand.

Southward of the island is a low rock which shows out in a detached form when seen from eastward or westward.

Southern coast.—From Pico-negro Point, the southern coast of Princes Island, as far as Ponta do Grosso, a distance of 3 miles, forms three bays separated by rocky points; the shores of the bays are very high, rocky, and wooded, and are commanded by the high peaks of the southern chain of mountains. The first point northwestward of Pico-negro Point is that of Portinho, off which is a rocky islet of the same name, around which the sea breaks heavily.

These bays afford no shelter, and the sea usually breaks along the shore; in the westernmost bay, within Ponta do Grosso, is a large stream of water.

Ponta do Grosso, at the southwestern extremity of the island, is a high, rocky headland formed by a hill named Barriga Branca, which, when viewed from the southeastward, shows two conical peaks; the point is steep-to.

The coast.—From Ponta do Grosso the coast trends north-northwestward $1\frac{3}{4}$ miles to a point marked by a small conical peak, and thence northward 1 mile to Formiga Point, the southern point of a small sandy bay, which does not, however, afford any shelter.

Ponta das Agulhas.—A little farther northward is the salient headland named Ponta das Agulhas, the southwestern extremity of West Bay, or Bahia das Agulhas. The point is surmounted by a peak, about 1,400 yards southeastward of it, whence the land slopes gently to the point, off which there is a small, rocky islet, Pedra das Agulhas, about 200 yards offshore, and a shoal, which covers at times, 800 yards northeastward of it.

West Bay, the safest and best in the island, being sheltered during the tornado season from southeasterly winds, as well as those from southwestward, is comprised between Ponta das Agulhas and Pedrinha Point 44° , a distance of 3.3 miles from it, and from this line the bay falls back $1\frac{1}{2}$ miles. When seen from the westward the appearance of the bay is remarkable, for in the foreground are five

apparent points, which make like five conical islets, as the lowland which unites them is not apparent from the offing, while in the background are the great elevations of Carriote, Papagayo (2,700 feet), and the Pico (3,050 feet).

The land at the head of the bay is low, and formed by hills separated by valleys, through which flow numerous streams, supplying excellent water; one of the best adapted for watering is at the foot of a hill about 1 mile from the northern part of Ponta das Agulhas. The bay is free from danger, and the water shallows gradually within the line joining the two points.

The high lands attract rain, and it frequently happens that here, as well as at San Antonio Bay, it rains heavily and for a long time on the land, without a drop falling on the shipping afloat.

The only inhabitants at West Bay consist of a few negroes.

Shoal.—A rocky shoal, with $1\frac{1}{2}$ and 2 fathoms water, extends off the southern shore of the bay, about 1 miles eastward from the northern end of Ponta das Agulhas; this danger should be carefully avoided by vessels wishing to obtain an inshore berth for watering.

Tides.—It is high water, full and change, in West Bay, at 3 h. 37 m.; springs rise $5\frac{3}{4}$ feet.

Directions.—The prevailing wind from southwest will enable a sailing vessel to haul around Ponta das Agulhas and choose a berth, but in rounding the point from the southward care must be taken to avoid a small detached rock, previously described, northeastward from Pedra das Agulhas.

Anchorage.—Good anchorage for a large vessel may be obtained in about 12 fathoms, with the northern extremity of Ponta das Agulhas 269° and the hill over watering place 188° .

Storms are of frequent occurrence, and occasionally the wind blows from northwest, when it is necessary to look to the moorings, but generally there is no danger. Tornadoes blow from the eastward, and with greater fury from coming over the high land; and if at single anchor, care should be taken not to foul it, as the vessel swings from riding to the southwest breeze. Leaving West Bay for San Antonio sailing vessels should start at high water, or the first of the ebb, and proceed southward of the island.

Pedrinha Point is a steep, rocky point at the northwestern termination of the central chain of mountains, and about 200 yards to the southwestward is the small rocky islet of Pedrim, about 150 yards offshore.

The coast.—Northward of the above point is a small sandy bay, through the northern boundary of which an arch has been formed by the sea, hence its name, Ponta Furada (pierced point), and beyond this, the coast continuing rocky, forms another indentation, terminating in Ponta do Broa Pequena, distant 1 mile, northward of Ponta

Furado. The coast is clear, with from 9 to 12 fathoms close to the shore.

Mai Marth Bay.—About 1,600 yards farther northward is Ponta da Mai Marth, the western boundary of a large bay, of which Ponta Flora, distant $1\frac{1}{2}$ miles in a northeast by north direction, is the eastern limit. The bay, which is 1,400 yards from its entrance to the head, and clear of danger, is sheltered from the prevailing wind and affords good anchorage, the only drawback being that, in common with all the bays of the island, it is subjected to alternate calms and violent squalls, occasioned by the mountains. At the head of the bay are numerous streams, and a house surrounded by some huts.

Eastward of Ponta Flora is a small bay, formed between it and Bombom Point, which is distant $\frac{1}{2}$ mile in an easterly direction.

The Brothers are two conspicuous islets to the southwestward of Princes Island; the larger islet, known as the Great Brother, is 130 feet high, and lies from Ponta do Groso, the nearest point of Princes Island, 199° , $12\frac{1}{2}$ miles, while the Little Brother, of similar elevation, is $10\frac{1}{2}$ miles 203° of the same point. Both islets are covered with brushwood, and are difficult to land on, in consequence of the surf; they are marked by white patches, caused by bird deposits. When seen from east or west, the Great Brother shows two paps; off the southwestern side of the Little Brother is a detached rock.

San Thome or Sao Thome Island—General remarks.—This island is much larger than Princes Island, and of greater commercial importance, but is less useful as a place of call, in consequence of its want of sheltered anchorages. It should not be approached by sailing vessels that do not intend anchoring, as calms, baffling winds, and strong currents prevail in its vicinity.

History.—The island is said to have been discovered on December 21, 1470, the day of San Thome (hence its name), by the Portuguese. It was not colonized until 15 years after, whence its prosperity for nearly a century was most remarkable, but in 1574 a body of negroes who had lived and increased in the bush made an attack on the unsuspecting inhabitants, and the warfare was kept up for nearly a century before the bushmen were subdued. Since then a series of causes, culminating in the discovery and colonization of Brazil, whose vast extent and superior climate induced all the colonists of San Thome to abandon it, reduced the island from its once prosperous condition to a state of ruinous decay, from which it now, however, seems to be recovering a little.

Aspect.—The island of San Thome, 25 miles long and 15 miles broad, lies between latitude $0^{\circ} 24'$ north and $0^{\circ} 1'$ south, and between the meridians of $6^{\circ} 28'$ and $6^{\circ} 46'$ east longitude. The island is very mountainous throughout, and in its central western part attains in Pico de San Thome an elevation of 7,021 feet, which is

covered with a dense mass of trees; and from its sides numerous streams find their way to the sea.

About 2 miles southeastward from this peak is another, 6,913 feet above the sea; 2 miles northward of it is Santa Maria Peak, elevated 4,757 feet. From this central mass two chains diverge, one in an east-southeasterly direction and the other to the southeastward, the latter range having, among other peaks, those of Maria Fernandez and Micundom, near the coast. From the last-named peaks the chain trends about west-southwestward and terminates in the sharp peaks of Cao Grande (Great Dog) and Cao Pequena.

The northern side of the island presents an immense plain, watered by a multitude of streams, and from its center, about 3 miles from the sea, rise an undulating chain of hills, the most northern of which is known as Morro Monquiqui (Guadaloupe). This part of the island is adorned with magnificent verdure, with many fine plantations of sweet cassava and calavances, as well as groves of coconut and plantain.

The island, when seen from the northeastward, at a distance of 60 miles, shows as three very remarkable mountains, viz: Pico de San Thome, whose summit is most frequently hidden by clouds; Pico Cao Grande, with its needle-shaped peak; and Pico de Maria Fernandez, the top of which resembles the form of a sugar loaf.

The northern shore of San Thome presents a pleasing aspect, as does also the eastern side.

During October and November the sperm whale is to be found off the southern end of the island.

The sea around the island is very clear, and the bottom can be distinctly seen in 6 fathoms water.

Population.—In 1904 the population consisted of about 40,000. The people reside principally in eight villages or towns, the principal being that of San Thome, in Anna das Chaves Bay, on the northeastern side of the island; but here and there some habitations are seen bordering on the shore. This is a Portuguese penal settlement, and there are about 400 convicts on the island; a regiment of black troops is also stationed here.

Products.—The island is composed of compact and heavy basaltic rock, covered by a very fertile soil, but its cultivation is neglected in consequence of want of labor. Its chief exports consist of cocoa and coffee; bullocks, pigs, goats, and fowls are plentiful and good, and may be obtained at moderate charges. Similar fruits and vegetables to those grown at Princes Island may be obtained, but not in any quantity. Excellent water and plenty of wood are procurable.

Currents.—When approaching the island of San Thome from the westward it is advisable, in order to take advantage of the Guinea Current, to keep northward of latitude $1^{\circ} 30'$ north until longitude 6°

east has been attained. By doing so the ship will avoid the Equatorial Current, which is found a little distance to the westward on the above parallel and occasionally even farther northward. This latter current sometimes surrounds San Thome Island, and on the meridian of longitude 6° east, northward of the island, has been found setting to the westward. Eastward of San Thome the current generally sets between north-northeast and north-northwest.

Ponta do Figo, the northern point of the island, is high and peaked, with steep rocky cliffs on its sea face.

About $1\frac{1}{2}$ miles to the eastward is Ponta Carregada, a low rocky point, surmounted by a small conical hillock named Morro Carregada. Between these points are two small bays, separated by a rocky point; the westernmost of these indentations has a sandy beach, and off the points are rocks which are partly covered at high water.

Ponta d'Agoa Ambo lies $1\frac{1}{2}$ miles eastward from Ponta Carregada, the shore between being broken and fringed with rocks, which cover at high water.

Ponta do Peixe.—From Ponta d'Agoa the coast takes a southeasterly trend for a distance of $1\frac{3}{4}$ miles to Ponta do Peixe, a rocky projecting point surmounted by a hillock, on which stands the ruins of a chapel dedicated to San Francisco. It forms a good mark for the anchorage in Man-of-War Road.

Ilha das Cabras, $\frac{1}{2}$ mile in length, is marked by two paps about 300 feet in height, and lies 1.4 miles eastward from Ponta do Peixe, and may be seen from a distance of about 20 miles. This island stands 800 yards within the northeastern edge of a shoal named Santa Anna, which extends off the northeastern coast of San Thome.

Light.—A fixed white and flashing light, elevated 313 feet above high water, and visible 18 miles, is exhibited from an open iron framework structure, 25 feet high, on the eastern summit of Ilha das Cabras.

Santa Anna Bank is a shoal extending off the northeastern coast of the island. As defined by the 3-fathom curve, it runs in a northerly direction for 4 miles from San Sebastian Point, and from thence in a westerly direction to Ponta d'Agoa Ambo; it has $2\frac{1}{4}$ fathoms on its outer edge 1,000 yards eastward of Ilha das Cabras.

Man-of-war Roadstead is about 1 mile off the northern side of San Thome Island, between Ponta d'Agoa Ambo and Ponta do Peixe. By reference to the charts and the exercise of common precaution, the anchorage is easily accessible; but it can only be deemed safe when compared with other places on the eastern coast; it is preferable to Anna das Chaves Bay during the tornado season, as the tornadoes blow directly on to the shore, whereas in the road they blow clear out to sea.

Landmarks.—About midway between Ponta d'Agoa Ambo and Ponta do Peixe and near the shore stands Fernandilla farmstead, consisting of several large conspicuous buildings, having yellow walls and red roofs; and at 800 yards eastward of Fernandilla, near the mouth of a small fresh-water stream there is a smaller farm, which comprises two wooden houses of a grayish color. There is no permanent village here, but from September to December a few huts are erected around some large trees by natives who come to gather salt from the salt ponds inside Ponta d'Agoa Ambo.

Anchorage.—The best anchorage for a large vessel in Man-of-war Road is with the middle of Fernandilla buildings bearing 188° and the Ilhas das Cabras Light 110° , in about 7 fathoms, over a sandy bottom. It may be advisable to moor if making a long stay, as the ship otherwise would be continually going over her anchor.

The anchorage should, if possible, be made from the eastward, as the winds and currents are baffling when passing the northern end of the island from the westward.

NOTE.—A letter should be sent to the governor announcing arrival, as permission must be obtained to remain at anchor in the Man-of-war Anchorage.

Supplies.—Water of a good description can be obtained from a small rapid stream, which flows into the sea about 600 yards eastward of Fernandilla House; as there is a surf on the bar, it is advisable to land a little west of the river. The river runs through a beautifully sheltered valley, where a ships company might be landed for recreation, with great advantage to their health. The water is not only much better than that in Anna das Chaves Bay, where the women are constantly washing with palm-oil soap, but is more easily obtained.

Wood is plentiful, and goats, good small sheep, pigs, poultry, fruit, and some vegetables may also be procured. There is good quail shooting here, but permission to shoot must be obtained at the farms.

Ponta do Vasconcellos.—From Ponta do Peixe or Fernao Dias the coast trends southeastward $2\frac{1}{4}$ miles to the low and salient point of Vasconcellos, the coast between being broken into sandy bays, separated by rocky points. Southward of the point is Praya Lagarto Bay, which is 1 mile broad and 1,200 yards to its head; it is only frequented by small vessels.

Ponta Sao Jose, on which there are the ruins of an old fort, is 2,200 yards southward of Vasconcellos Point.

Ponta San Sebastian is a low point with a fort on it, situated 2,200 yards 130° from Ponta Sao Jose.

Light.—A fixed white light with red sector, elevated 53 feet above high water, is exhibited from a structure with an octagonal lantern

at the fort. The white and red lights are visible from a distance of 8 and 6 miles, respectively. For sectors, see Light List.

There is a semaphore station at Fort San Sebastian.

Anna das Chaves Bay lies between the above-mentioned points; from a line between these points it falls back about 1,400 yards, with depths varying from 1 to $2\frac{1}{2}$ fathoms.

Both the points of the bay are rocky, but the head of the indentation consists of a sandy beach on which stands the chief town of the island, known as Cidade de San Thome, which is almost entirely built of wood, and is of greater extent than it appears to be from the anchorage.

The bay is perfectly free from danger, and although open to winds from the eastward and northeastward, it offers to small vessels a safe and commodious anchorage, but those drawing over 10 feet are compelled to remain outside the line between the points, where, however, the holding ground is excellent.

The bay is said to be filling up, and the depth of water between Pescador Bank and the shoal extending from the island appears to be decreasing.

Pescador Bank, and Anna das Chaves Bank.—In addition to the bank of Santa Anna, already alluded to, which extends off the northeastern part of the island, the northern and eastern limits of which bank are nearly marked by Ilha das Cabras, there are two other banks, all but connected, and occupying a space of 2 miles, nearly north and south. The depths on these banks vary from $2\frac{3}{4}$ to $3\frac{3}{4}$ fathoms, and the extremes are nearly equidistant (about $1\frac{1}{4}$ miles) from Vasconcellos Point. The northern portion of these banks, $\frac{1}{2}$ mile in length, is known as Pescador Bank, while the larger and southern part is called Anna das Chaves Bank.

These banks are reported to have extended to the eastward of the position shown on the chart.

Light.—A fixed red light is exhibited at the end of the custom-house pier

Lightbuoys.—A buoy showing a fixed red light is moored at a distance of 1.6 miles 70° from San Sebastian Light.

A buoy showing a fixed green light is moored at a distance of 1,000 yards 18° from San Sebastian Light. This is now the only anchorage buoy.

Tides.—It is high water, full and change, at Anna das Chaves Bay, at 3 h. 25 m.; rise of tide at springs, $4\frac{1}{2}$ feet. The tides are regular in the bay; but outside the currents are weak and uncertain, and frequently set to the northward and northeastward.

Caution.—Less water is reported in Anna das Chaves Bay and its approach; a vessel's movements must, therefore, be guided by the lead.

Directions.—Vessels intending to anchor off Anna das Chaves Bay should approach from well to windward, with the cemetery gateway (the white walls of which will be easily recognized) just open northward of Fort San Sebastian (which makes like a white conspicuous house), bearing 269° , until Ilha das Cabras Lighthouse bears 329° , when any of the anchorages may be steered for.

When approaching the anchorage from the southward, give Ponta do Prayao, the easternmost point of the island, a berth of about 1 mile, and steer for Ilha das Cabras, and select an anchorage as convenient.

In proceeding northward from the anchorage in Anna das Chaves Bay, keep Fort San Sebastian bearing northward of 256° until Ilha Santa Anna comes just open of Ponta do Prayao, 184° ; then steer northward, keeping the island open of the point until the southern extremity of Ilha das Cabras comes on with the northern extremity of San Thome Island, 278° , when the vessel will be clear of the Pescador Bank.

For sailing vessels, when about 10 miles offshore, variable winds, with calms and squalls, are frequently experienced, and retard the approach to the anchorage. During the night, when about 5 miles offshore, the land wind is fallen in with, generally weak and variable, and care should be taken not to be set northward, in order to take advantage of the first sea breeze, which sets in between 10 and 11 a. m. These are the only difficulties in approaching the anchorage.

Anchorage.—A boat carrying a square blue flag with C in the center will indicate the anchorage for vessels arriving; at night she will show a white light.

Vessels of light draft should anchor well inside of Fort San Sebastian, as there are generally long rollers from the southeastward setting in, and during the tornado season they should anchor in the northern part of the bay.

At the anchorage the water is generally smooth, and the wind usually favorable for rafting off casks; but after tornadoes, or when the swell sets in, the sea breaks right across the bay, but not dangerously, or so as to prevent boats landing.

Vessels of moderate draft will find a good position in about 6 fathoms with the cemetery gateway open of Fort San Sebastian, 269° , distant $\frac{1}{2}$ mile from the fort. In this outer anchorage, however, there is nearly always a considerable swell from the southward, and as the vessel swings both northward and southward, according to tide, care is necessary to keep a clear anchor.

Prohibited anchorage.—Vessels approaching the anchorage off Anna das Chaves Bay from the southward should not anchor until the prison (a building close to the shore $\frac{1}{2}$ mile southward of Fort San Sebastian and between it and Fort San Jeronimo) bears south-

ward 236° , in order to avoid fouling the telegraph cables, which are landed near the prison.

The town called Cidade de Anna das Chaves is the capital of the island; it extends in the form of an arc for a distance of $1\frac{1}{2}$ miles along the shore at the head of Anna das Chaves Bay. The appearance of the town from seaward is pleasing and picturesque, as the tiled wooden houses, numbering about 900, are interspersed amongst the trees. The streets are broad and well laid out, and the houses generally are tolerably well built. A large hospital, now in a state of decay and unfit for Europeans, stands on the northern point of Anna das Chaves Bay. The two portions of the town are connected by an iron bridge which spans the Rio de Agua Grande.

There are several churches built of stone; among others the cathedral, la Conceição, and la Misericórdia; there is also a civil prison, which is a yellow building, a town hall, and a customhouse; the last named being a large building, in front of which is a pier; the telegraph station, which is white, is, however, the most conspicuous building in approaching the bay.

At the back of the town are three large marshes, which become lakes during the rainy season; these are detrimental to the health of San Thome.

The population in 1904 was 8,000 persons.

Landing can usually be effected at the pier; but with a considerable amount of swell on, the best place is under the fort, avoiding the low water rocks.

Climate.—The climate, though humid, is moderately healthful; the rainy season is from September to May. Maximum temperature, 94° , in February; minimum, 56° , in August.

Supplies.—Supplies of all kinds can not always be obtained. The water of the Rio de Agua Grande is not now fit for use, but good water may be obtained from the port office. A tank holding 8 tons will deliver it alongside for a small charge.

Coal.—In 1910 it was reported that Messrs. Lima and Gama had 600 tons of coal in stock, which was being increased to a permanent 1,000 tons, and that the Portuguese Government also kept a stock of about 1,000 tons.

Communication.—Steamers of the Portuguese Empresa Nacional Line, which leave Lisbon on the 1st, 11th, and 21st of every month, call at San Thome.

Telegraph.—The city is connected by submarine cables with Loanda, Libreville, and Princes Island.

Observation stone, 252° 200 yards from the Customhouse Pier, is situated in latitude $0^{\circ} 20' 38''$ N., longitude $6^{\circ} 44' 07''$ E.

The coast.—From Ponta San Sebastian the coast is rocky, indented, and fringed with rocks as far as Ponta do Praiao, a distance

of $3\frac{1}{2}$ miles southward. At the distance of 1 mile from Fort San Sebastian, on a slight, well-wooded eminence, is the ruined Fort San Jeronimo, and $\frac{3}{4}$ mile farther southward is a stream of fresh water.

Ponta do Praiao is a salient feature, of moderate elevation, surrounded by rocks which cover and uncover; southward of this point the land rises rapidly, and at the distance of 1 mile from the point is a small conical hill.

Landmark.—Three isolated coconut trees stand on the extremity of Ponta do Praiao. A short distance back from the coconut trees there is a high house resembling a Swiss chalet, painted gray and white. This house can be seen a long distance seaward.

Almaxarim and Santa Anna Bays.—From Ponta do Praiao the coast trends southwestward for nearly 4 miles to Ponta das Angolares, the coast between forming two indentations, known as Almaxarim and Santa Anna Bays; in both are rocks, but in the former they extend far offshore; at the head of the latter is the chapel of Santa Anna.

Ponta das Angolares is of moderate elevation, and faced with rocky cliffs toward the south; it is distinguished by a solitary palm and by several distinct clumps of other trees.

Ilha Santa Anna is a rocky islet of moderate height, with its summit covered with bushes. It lies 1 mile northeastward from Ponta das Angolares, and when not shut in with the San Thome coast, may be seen from a distance of 16 miles. Although the shores of the islet are steep-to, and the passage within, about 1,400 yards broad, free from danger, it is advisable to keep well outside the island, in order to be clear of the baffling winds and squalls which prevail inshore. Off this part of the coast the bank of soundings extends about 3 miles.

Angra das Angolares.—Immediately southward of Ponta das Angolares is a sandy cove, 1,600 yards in extent. Its beach is intersected by three streams, of which those to the north and south are important watercourses. Some houses are seen on the shore of the cove, but the place has not been surveyed.

Balsa Grande is apparently a shoal with less than 6 feet on it, situated 1 mile southeastward of Angra das Angolares.

Praia do Rei—Lights.—At Praia do Rei, when the local steamer is expected, leading lights (front green, rear red), visible about 5 miles, are shown, which kept in line 314° lead up to the anchorage.

The coast.—From Ponta das Angolares the coast trends southwestward, 9 miles, to Ponta dos Morcegos, the shores between being irregular in outline, with rocky points and sandy bays, while in other places steep cliffs rise from the sea, into which at various places several mountain streams fall; but there are no signs of any habitations.

Ponta dos Morcegos is a sharp, bold point, surmounted by a small conical hill, and within it, to the westward, about 1 mile distant, is the mouth of a mountain stream.

From this point to Ponta do Agoa, a distance of 3 miles in a westerly direction, the shore is composed of abrupt cliffs, with several rocky points inclosing sandy bays. Off the northernmost of these points is a black rock which never covers, and off the next point are two rocks, nearly always breaking.

Ponta Aguili.—From Ponta do Agoa the shore trends to the westward for $1\frac{1}{2}$ miles to Ponta Aguili, off which a reef extends 800 yards, the outer rock being always above water.

Angra de Sao Joao.—The above point is the northeastern boundary of the circular bay known as Angra de Sao Joao, which is $1\frac{1}{4}$ miles across between Aguili Rock and Ponta Sao Joao, the southwestern point of the bay, and is about the same distance to its head. Three rivers fall into the rocky shores of the bay, and the land rises very suddenly from the coast. At the western side of the bay, near one of the rivers, is the village of Sao Joao, but the place affords no shelter and has not been surveyed.

The coast from Ponta Sao Joao trends southwestward $1\frac{3}{4}$ miles to Ponta Preta, the shore between being rocky and fringed with rocks, and at the summit of the hills bordering on the shore is a small but richly cultivated plain.

Pramanga Bay lies between Ponta Preta and Ponta Pramanga, the distance across being $\frac{1}{2}$ mile. The bay is rectangular in form and nearly 1 mile in length, with a stream of water at each inner angle, but as it is exposed to the southeastward it is only frequented by small coasters. The western shore of the bay is foul, and the depths vary from 9 fathoms at its entrance to $3\frac{1}{4}$ fathoms close to the sandy beach between the two streams.

Between Ponta Pramanga, which is fringed with rocks, and Ponta da Balea, the southern extremity of San Thome Island, the distance is $1\frac{1}{2}$ miles in a west-southwesterly direction, the shore being broken with occasional low-water rocks.

Seven Stones consist of a reef of rocks $\frac{1}{2}$ mile in extent, the largest and highest of which are near the center. They appear like a ship under sail when seen from the northward. They lie $169^{\circ} 2\frac{1}{2}$ miles from Ponta do Agoa and are close to the edge of the bank of soundings. As they are steep-to, they do not form a danger by day, but should be approached with great caution at night.

Ilha das Rolas.—This island, which is volcanic, is the largest offlying San Thome, is upward of 1 mile in length, and is distant 1 mile from the south point of San Thome. It is high and covered with large trees, including coconut, and has at its northern end a small conical hill; when seen from a distance the island shows as two.

Anchorage.—Off the northeastern point of das Rolas Island the 3-fathom line extends $\frac{1}{2}$ mile from the coast. Good anchorage may be had on the northwestern side of the island in $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms, with the summit bearing 121° , and here shelter is afforded from southeasterly winds during tornadoes. In any case the vessel will drive to seaward, but the anchorage is not recommended with southerly or southwesterly winds, which generally create a swell.

In October, 1890, the British naval vessel *Swallow* found good anchorage in $5\frac{3}{4}$ fathoms, fine sand and stones with the summit of the island bearing 166° , and the northern extremity of the Seven Stones bearing 76° . The prevailing winds were southward and westward, causing a slight swell.

Landing is impracticable at its southern end, but a good landing free from surf can be made abreast of the houses which lie on the eastern part of the northern side of the island. The landing is sheltered by a reef that runs out from the western extremity of the houses for about 100 yards, curving round slightly to the eastward at its outer extremity. The sea generally breaks over this reef; great care should be taken by boats to clear it. Under its shelter a safe and dry landing can be effected.

Trade—Supplies.—The island is owned by a single individual, who has a manager and about 100 Angolas to farm it. The chief articles of export are cocoa and coffee. It is said that there are 54,000 cocoa trees on the island; amongst the trees there are the orange, coconut, and the breadfruit, called by the inhabitants sap sap; also a species of mahogany. A variety of vegetables and excellent pineapples are cultivated. There are pigs, goats, geese, and other poultry, while in the wood a vast number of green pigeons and turtledoves (rolas) are to be found; hence the name of the island. In November turtle visit the island.

Channel.—The channel between the southern coast of San Thome and Ilha das Rolas is safe and clear, with 6 to 10 fathoms in its center.

Santa Catharina Bay.—The northern point of this bay, which forms a curve about $1\frac{1}{2}$ miles in extent, lies northward from Ponta da Balea; the bay affords good anchorage against southeasterly winds, but is unsafe with winds from the ordinary quarter. About the center of the bay is a small village of the same name, consisting principally of the huts of fishermen, who are compelled to obtain fresh water from the stream which flows into Pramanga Bay.

Anchorage.—The best anchorage is abreast of the village, in about $6\frac{1}{2}$ fathoms, with the northern cone of Ilha das Rolas open of the western end of Ponta da Balea.

Santa Catharina Point is high and bold. One mile westward a reef called Balza do Flamengo is charted, but its existence is

doubtful. From Santa Catharina point the coast trends northward, and is almost entirely composed of abrupt rocky cliffs, to as far as Ilheo Macaco.

Ilheo Macaco is a large rock of moderate height, which lies close to the coast, and is situated in the bight of the bay between Santa Catharina and Pillar Points, but the locality has not been properly surveyed.

In line with the island are the two sharp peaks of Pico Cao Grande and Pico Cao Pequena. The last-named peak is about $1\frac{1}{2}$ miles from the coast, and two other lower hills surmount the bold coast.

Near the island, on the northern of the only two sandy beaches of the bay, are some fishermen's huts; and between the island and Pillar Point are two small rivers.

Pillar Point is a sharp, wedge-shaped point, fringed with rocks.

Pillar Bay.—From the above point the bay extends in a northerly direction, $1\frac{1}{2}$ miles to Ponta Gabado. Between these points Pillar Bay forms an arc, with much rocky shore, but with a sandy beach at its head, intersected by a small river. The bay is well sheltered from easterly and southeasterly winds, but it has not been perfectly surveyed.

Ilheo de San Miguel and Formoso.—Off Ponta Gabado are three (the chart shows only two) small islets; of these the southern and largest is Ilheo de San Miguel, and the northern and next in importance Ilheo de Formoso; both these islets are covered with bushes. The last-named islet is abreast a small sandy cove, at the head of which are some huts.

Ilheo de Souza.—From Ilheo Formoso the coast, rocky and bold, extends northward $2\frac{3}{4}$ miles, to the head of a large bight, whence it trends northwestward as far as a rounded point, surmounted by a hill, known as Morro de Souza, and off which is the small Ilheo de Souza.

Ilheo Venangelo.—About 1,600 yards farther northward is the high and wedge-shaped Ilheo Venangelo, close to the coast; the eastern end is high, and falls in a straight line to the westward.

Ponta Furada.—About $1\frac{3}{4}$ miles from this islet is Ponta Furada, steep and bold, with an opening worked by the sea.

Ponta Diego Vas.—From Ponta Furada the land trends northeasterly as far as Ponta Diego Vas, a distance of $5\frac{1}{2}$ miles, the intervening coast presenting occasional cliffs of moderate elevation. Ponta Diego Vas is a rounded point, fringed with rocks, on which the sea breaks.

Ponta das Neves.—From the above point the coast trends east-northeastward $4\frac{1}{2}$ miles to Ponta das Neves, on which stands a small hamlet, with a stream of water on its eastern side.

Conchas Bay.—From Ponta das Neves the shore falls back $1\frac{1}{4}$ miles to the southeastward, and thence runs northeastward to Ponta do Figo, the northern point of San Thome Island, the bight between being known as Conchas Bay, but its possible advantages as a place of anchorage remain unknown, in consequence of its not being surveyed.

Soundings.—All along the coast comprised between Santa Catharina Point and Ponta Figo the shores have been imperfectly examined; it is therefore unadvisable to close this coast, especially during calms. The limit of the bank of soundings also has not been determined, but there is no doubt that on the western portion of the island the deep water approaches closer to the shore than on the eastern side.

Annobon Island.—This island, the smallest and most offlying of the chain of islands in the Bight of Biafra, is nearly $4\frac{1}{2}$ miles in length, north and south, with an average breadth of $1\frac{1}{2}$ miles. Annobon was discovered in 1471 by Escobar and Santarem; it was transferred to Spain by the Portuguese in 1778, at the same time as Fernando Po.

Aspect.—The island lies 105 miles southwestward from San Thome Island, and rises in varied and picturesque forms to a considerable elevation in the central part of the island, forming three peaks, of which the most northern, Pico do Fogo, is of conical shape, and attains an elevation of 1,350 feet above the sea.

This peak, which is richly wooded to within a short distance of its summit, is flat-topped for a distance of about 10 yards, and over it the wind sweeps with great violence. Close to the foot of the peak on its northwestern side is a beautiful little lake, filling what appears to be the crater of an extinct volcano; it is about 1 mile in circumference, with 9 feet in its deepest part, and the water is sweet. At 2 miles from the southern point of the island rises the peak Do Centro, 3,250 feet in height, and nearly 1 mile southward that of Dos Sulcados.

The island may be seen in clear weather from a distance of 40 or 45 miles and be approached with safety to the distance of 1 mile. The central parts of the island are covered with orange and lime trees, and near the sea there are groves of coconut and plantain trees.

Population.—Annobon is inhabited solely by negroes, who number about 2,000, the descendants, it is supposed, of a cargo of slaves shipwrecked while on their way to Brazil from the Portuguese colonies in Africa during the sixteenth century. They are hardy and inoffensive and obtain their subsistence chiefly from the sea. Many of them speak English. They suffer much from skin disease, which may be attributed to their want of cleanliness. The principal town is prettily situated in a grove of coconut trees, on the margin

of an open bay on the northeastern side of the island, and is said to contain about 500 inhabitants.

Climate.—There are two rainy seasons at Annobon, the one in the months of April and May, and the other during October and November. Although differences of opinion exist respecting the salubrity of the island, there seems no doubt that it is far more healthful than the other islands in the Bight of Biafra, which may be attributed to its distance from the African shore, to its being always surrounded by the comparatively cold waters of the Equatorial Current, and to the absence of marshy land and stagnant waters.

Products and supplies.—Annobon is rarely visited except by ships in want of fresh provisions. The island produces plenty of wood, of which a stock is generally kept ready cut at the village of San Antonio; it is also well supplied with good water, which flows into the sea a short distance southeastward of the anchorage.

Pigs and fowls may be produced, as well as pineapples, plantains, bananas, coconuts, pomegranates, oranges, limes, tamarinds, yams, and sweet potatoes. The orange, however, is essentially the fruit of the island; they grow in incredible quantities, are full of juice, and have an exquisite flavor; they are generally ripe in July, August, and September. Supplies, however, can not always be depended on.

Money is not required to obtain supplies, as the natives prefer being paid in kind, and readily take in exchange old clothes, hardware, gunpowder, needles and thread, spirits, tobacco, pipes, and salt. Though no duty is claimed for anchorage and water, it is customary to make a present of a few of the above articles to the native governor, to the priest, and to the man who acts as interpreter.

Esteves Point, the northwestern extremity of Annobon, is formed of steep rocky cliffs, which extend as far as Ponta do Ilheo.

Ponta do Ilheo is low, with a small rocky islet close to it, 1,200 yards northeastward from Esteves Point, whence a sandy shore commences and continues to San Antonio Point, the northern end of the island.

Pyramid Point is sandy and rendered remarkable by a number of black rocks off it, the most conspicuous being a pyramidal-shaped rock, which gives its name to the point.

Ponta Pedrinha, southeastward of Pyramid Point, is a rocky point fringed with rocks; and thence 600 yards to Ponta do Agoa, a rounded rocky point, southward of which is a running stream, to which access is difficult on account of rocks and surf.

Passage Point lies 600 yards southeastward of Ponta do Agoa, and is a rocky point rising almost perpendicularly to a mount, the face of which presents needle-shaped rocks, of basaltic formation.

Turtle Island, about $\frac{1}{4}$ mile in circumference, lies 1,600 yards northeastward of Passage Point, close to the limit of soundings, and is steep-to within a moderate distance.

Passage rock, small and flat, is only a few feet above the water, and lies 600 yards southwestward of Turtle Island, the passage between being perfectly safe, with 6 and 7 fathoms water.

Tides.—It is high water, full and change, at Annobon Island, at 3 h. 45 m.; springs rise 5 feet.

In December the current off San Antonio has been found setting northwestward, varying in strength from $\frac{1}{2}$ knot an hour to nearly $1\frac{1}{4}$ knots. The stream was found to be weakest at the time of new moon; and the greatest rise of tide 8 feet.

Caution.—The anchorage between San Antonio and Passage Points must be approached with caution, as it has not been thoroughly surveyed, and patches of coral evidently exist.

Anchorage.—Between San Antonio and Passage Points, the island is fringed by a shallow bank, extending in some places 400 yards offshore. The best anchorage to be found off the island is about $\frac{1}{2}$ mile northeastward of the town, where there are from 10 to 15 fathoms, sand, which forms a good holding ground; here the water is smooth. The bearings from this position are Turtle Island 120° , and Ponta Ilheo 245° .

Another anchorage is in 6 or 8 fathoms with Turtle Island 80° and Passage Rock 147° . This position is near the watering place, whence excellent water may be obtained, but only by leading a long hose from a force pump through the surf to the boat.

San Antonio village.—From San Antonio Point to Pyramid Point, $\frac{1}{4}$ mile to the southeast, the beach is still sandy, and between them stands the village of San Antonio, the largest in the island, but the houses are small miserable hovels, rudely constructed of rough-hewn planks and mud. The chief of this village is recognized as the governor of the whole island. There is a small pier at San Antonio village.

Landing.—It is stated that landing is easily effected off the village. The best landing place, which, however, is not free from surf, is on the east side of the reef east of Pyramid Rock; as the shore at this place is rocky, it is advisable to engage a native at first. The surf is said to be heaviest between March and December.

The coast.—From Passage Point the land trends southward for $2\frac{1}{4}$ miles to Martinho Point, the coast between being nearly straight, with an intervening rocky point on which are several black rocks, and one assuming the form of a sugar loaf.

South Point is low and sharp at its extremity, but rising within suddenly to Pico dos Sulcados. The coast between these points

forms two small bays, in the northernmost of which is the village of San Juan.

Lagos Point, at the southwestern end of the island, is distant nearly 1 mile westward of South Point; it is rocky and rounded in form, with a considerable reef of offlying rocks projecting out $\frac{1}{2}$ mile, on which the sea generally breaks.

Alvaro Point.—Over this point is a moderately high peak, the summit and sides of which are marked by numerous sharp rocks.

From Alvaro Point to Esteves Point the coast trends northward $3\frac{1}{2}$ miles without any remarkable salient feature; and this, the western side of the island, though safe and steep-to, should be avoided, as it affords no shelter to shipping.

Islets.—About 800 yards south by west from South Point is Adams Islet, small and rocky, and presenting two heads when viewed from east or west. From 1 to $1\frac{1}{2}$ miles southwestward from Lagos Point are three small islets or rocks named Santarem, Escobar, and Fernando Po, after the three navigators who discovered the islands in the Bight of Biafra; these rocks are distinguishable from a distance of 18 miles. The locality has not yet been sounded over, but it is presumed that, like the coasts of the island, these rocks are steep-to.

Winds.—The prevailing winds, from the southward and southwestward, blow with moderate force, and little variation throughout the year, thus enabling vessels under the shelter of the land to ride at anchor in smooth water and perfect safety. Only during the months of March and September, when tornadoes from the eastward prevail over the general sea breeze and blow directly into the anchorage, is any danger to be apprehended; but as the gloominess of the sky and the heavy thunder and lightning by which they are preceded always give timely notice, vessels not having good ground tackle may get under way and stand off until the storm, generally of short duration, has passed over.

Currents.—From January to April the current runs generally to the northwestward, but is deflected eastward off the south coast of the island. From then to June it sets northwestward from 10 to 40 miles a day till August, when it sets round the island to the northeastward. In October it appears to encircle the island running to the eastward off the west and northern coasts and to the southward and westward on the eastern and southern coast. In November and during the remainder of the year it runs steadily to the north-northwestward from 10 to 30 miles a day.

The influence of the Equatorial Current is said to have a most beneficial effect on the climate of Annobon Island, and on this sub-

ject, as well as on the Guinea and Equatorial Currents generally, Capt. Sabine, of the Royal Artillery, has written as follows:

The occasional advance of the cold water of the Equatorial Current to the island of San Thome may assist in explaining an apparent peculiarity in the climate of that island when compared with that of the coast of Western Africa generally. At all the British possessions, from the Gambia, in latitude 13° N., to the forts on the Gold Coast, June, July, and August are accounted the unhealthy months; while at San Thome, on the contrary, those months are for Europeans the most healthy in the year, though not for the negroes, who then suffer from cold and rheumatism.

Situated on the Equator, San Thome has naturally two cold seasons or winters in the year, the sun being nearly equally distant in June and in December; but in June, July, and August is superadded the influence of the surface water of the ocean, several degrees colder than in November, December, and January, rendering the former months preeminently the winter of San Thome.

The comparative unhealthiness of Princes Island to that of San Thome and of both to Annobon as the residence of Europeans has been frequently and particularly noticed by the Portuguese authorities, and is universally recognized at the two former islands. It may be sufficient explanation to remark that Annobon is always in the Equatorial Current; Princes Island always in the Guinea Current; and that the position of San Thome is intermediate and its climate is occasionally influenced by both. In tropical climates a very few degrees of temperature constitute an essential difference in the feelings of the natives and in the health of the Europeans.

CHAPTER VIII.

CAPE LOPEZ TO THE KONGO RIVER.

Lopez Island, also called **Mandji Island**, of which **Cape Lopez** forms the northern extremity, is separated from the continent by the **Aranga** or **Lopez River**, which falls into the bay of the same name, the **Yombe** and other rivers forming the delta of the **Ogowe River**; and also by the **Animba** or **Mexias River**, which joins the sea on the southern side of the island, 24 miles southward of the cape; the intervening shore being sandy, and without offlying dangers.

The river system of the region in the immediate vicinity of **Cape Lopez** was explored by **M. du Chaillu**, who found that the **Mexias** and **Fernand Vaz** and other rivers are branches of the great arterial **Ogowe River** and not distinct rivers, as was previously understood. These streams form, with the intervening lowlands, which are evidently alluvial deposits, an extensive and very complicated network of creeks, swamps, and dense forests, which are, in fact, the delta of the parent river.

The Coast.—From **Cape Lopez** the coast, which is imperfectly surveyed, trends in a southerly direction for 87 miles to **Cape St. Catherine**; it is clear the whole distance and may be approached to a distance of 2 miles in 5 or 7 fathoms. Between **Cape Lopez** and **Sette Point** the coast is sparsely populated. As far as **Fernand Vaz** it is uniformly thickly wooded. Southward of **Fernand Vaz** the appearance of the island is more varied, displaying large patches of bare ground interspersed with thick jungle. There is a clump of trees near **Cape St. Catherine**.

Landing.—Along the whole distance the surf is very heavy, except in a few spots, where boats may sometimes land on exceptionally smooth days.

Animba or Mexias.—This river empties into the sea southward of **Lopez Island**; its actual mouth is very narrow, but its breadth is said to be increasing.

Adjuni Bank is a sand spit running parallel to the land for 8 miles on the southern side of the entrance to **Animba River**. The lands eastward of this bank are much cut up by numerous streams, not yet carefully explored, but in about latitude $1^{\circ} 02' S.$, eastward of the point where the spit commences and on which stands the almost abandoned village of **N'Jale**, the **Animba River** is navigable

and receives the Nango Nange River, by means of which the Ogowe is reached; farther eastward are other rivers, all navigable and communicating with Fernand Vaz River.

Anchorage.—Anchorage may be obtained off the entrance of Animba River, but care must be taken to avoid a reef which extends from the southern point, halfway across the channel.

Fernand Vaz River.—This river falls into the sea through a narrow mouth between the points of two mangrove-covered islands, and when seen from seaward shows four breaks in its line of trees; it is the southern outlet of the Ogowe River, and of its confluent the Rembo N'Komi River, which runs nearly parallel to the coast from the southward for a distance of 25 miles. The sand banks at the entrance of the Fernand Vaz are so constantly shifting as to render any specific directions entirely useless, and the channel, which generally preserves a depth of $2\frac{1}{2}$ and 3 fathoms, is invariably intricate.

This river and the Animba throw into the ocean during the rainy season a vast quantity of fresh water, which forces its way through the sea for a distance of 4 or 5 miles before it becomes absorbed; and at times the flood tide has no perceptible effect on the rapid current.

Bar.—The position of the mouth of the channel is not to be depended on; at one time it was fully $2\frac{1}{2}$ miles northward of Pilots village, with a tongue of sand extending about 3 miles from the southern point. The bar at that time appeared absolutely impracticable, as the surf was breaking violently over its entire length. The depth of water about $1\frac{1}{2}$ miles outside and parallel with the bar was not less than 26 feet.

Pilots for the bar can be obtained at the customhouse village.

Anchorage.—The best anchorage is in 6 or $6\frac{1}{2}$ fathoms southward of the entrance, about 2 miles from the shore; it is out of the current and convenient for landing.

Communication with the shore is dangerous for boats, as the waters are infested with sharks, but persons wishing to do so can generally land in canoes abreast of the factories and customhouse on Southern Point.

NOTE.—The plan of Fernand Vaz is old and probably quite unreliable.

The Agule is from 230 to 160 feet in breadth, and is comparatively free from dangers. Vessels of about 6 feet draft can navigate the Agule at the wet season only. This river connects Fernand Vaz with the Ogowe by passing from it into the Obando River, the northern entrance to which is opposite the Ninge Saka Islands. There is also a channel from the Obando to the Ogowe through In-congonie Creek, which enters the latter river above Buiti Island, opposite N'Gubue Island. A pilot is always necessary. The stream varies according to the season from 0 to 3 knots.

Dame Island, which is situated at the mouth of the Agule River about 7 miles within Fernand Vaz mouth, is surrounded by a mud and sand bank and a narrow channel for vessels drawing 6 feet.

Bale Island is at the entrance to Lake Nchonguen Chine; the lake abounds in fish. Good anchorage on a muddy bottom, in 13 feet water, is to be had to the northward of Bale Island.

Farther to the southward is the island of Chongadiana and Jalli Uenga village, where there is a settlement. There is a dangerous rock off the island, to avoid which the eastern shore must be approached.

On Point Gumbi is an important branch of the Catholic mission.

Ningue Sika Island, which lies nearly opposite the M'Pivie Lake, is well cultivated, and has on its southern side an extensive muddy sand bank, through which is a narrow channel which leads to within $\frac{1}{2}$ mile of the south extremity of the island. Here there is a British factory, and pilots may be obtained for the Rembo River.

M'Pivie lake is navigable for vessels of 6 feet draft; its entrance is obstructed by a sand bank, but there is good anchorage south of Ninge Penda village; its shores are covered with rubber trees.

L'Eliva N'Komi, or N'Komi Lagoon.—The entrance to this lagoon is about 25 miles southward of Fernand Vas mouth. The Rivers Rembo N'Komi and O'Bangue empty themselves into it.

Rembo N'Komi.—The entrance to this river is subject to change, but navigation is not difficult. There is little current, but from N'Gumbi Point, 25 miles up, it gradually increases and runs from 3 to 4 knots an hour in the rainy season, making navigation difficult. There is a British factory near the entrance to Lake Nimbe, the latter being nothing more than a great marsh $2\frac{1}{2}$ miles long and 1 broad. The river here is about 40 yards broad, in some places only 20 yards, and the trees grow over so as to only permit of the passage of boats. There are British and German factories on this river. The territory of Kama is under the authority of the chief of Tugunamba, who is the principal king.

Trade.—There is a considerable trade carried on here in ivory, india rubber, and ebony. There is also a trade in salt fish from Lake N'Chongo Chine.

Metuton Point, about 22 miles southward of Fernand Vaz River, is well wooded and has on its northern side the small river Paraidia.

M'Pando.—This place is situated on the western shore of N'Komi Lagoon. It is connected by telegraph with Libreville and Loango, but the factories formerly here have been abandoned. There is a path leading to it from the coast.

Cape St. Catherine forms only a slight projection from the usual coast line, with a reef extending northward on which the sea breaks heavily. A vessel running down this coast should not approach

the point nearer than 4 miles. When coming from the northward the point appears like an isolated clump of lofty trees, but from the southward the shore assumes a craggy appearance.

Some hills of slight elevation southward of the point give the shore a bold appearance. Above the beach the land rises gently and shows a few clearings, with a little vegetation, giving the country a cultivated aspect, which continues more or less as far as Kabinda.

Soundings.—The 50-fathom line probably runs parallel to the coast, between Fernand Vaz River and Cape St. Catherine, at a distance of 22 to 23 miles off it, the depths decreasing gradually to 7 fathoms $1\frac{1}{2}$ miles from it. There are depths of 20 and 23 fathoms 11 and 13 miles, respectively, westward of the cape.

N'Gove River is the entrance to N'Gove or Bangué Lagoon, about 6 miles southward of Cape St. Catherine. Its narrow entrance is obstructed by shoals.

The lagoon has very little water in it and is encumbered by islets, making navigation difficult. The Rembo Rabi enters it, and on its southern peninsula is the settlement of Iguela.

Iguela, or Engui, is the name given to a collection of three or four thatched houses used as stores, erected close to the shore, which are very conspicuous from the sea; they are situated about 6 miles southward of Cape St. Catherine. The factories of Iguela are some distance inshore, but their flags can be seen through an opening in the trees. There are no British factories.

Anchorage may be found about $1\frac{1}{2}$ miles offshore southwestward of the light.

The coast between Cape St. Catherine and Sette Point, 32 miles to the southward, is slightly elevated and covered with bushes, and intersected with the mouths of some small rivers, which lead to lagoons and marshes in rear of the coast line. There are rocks off it, and breakers about 1 mile from it. Here and there villages, amongst which are Sangobia and Digobe, may be seen amongst the trees. Farther to the southward are two points named Magamba and Milango.

Capota village is a cluster of huts, 21 miles southward of Iguela.

Sette Point or Komandji is a rounded point about 32 miles to the southward of Cape St. Catherine. About 7 miles southward of this point, near the village of Avouma, is the former entrance to Sette Cama Lagoon, now only available for canoes.

Sette River.—This river, rising in the mountains of Camplida, and said to be 260 miles long, conveys to the sea the waters of Simba, Souga, and N'Dogae Lagoons, the last named being the principal. According to the French chart this river has two entrances about 6 or 7 miles apart, the northern entrance (Sette River) leading northward and the southern (Sette Cama) leading southeastward, parallel

to the coast to the N'Dogae Lagoon, and separated from the sea by a long tongue of sand, 600 yards broad. Little is known of the N'Dogae Lagoon; it is about 40 miles in length in a northwest and southeast direction, and contains about 300 islands, high and wooded. There are many kola, palm oil, and rubber trees. There are two British factories in the northern part and one British and one German in the southern part of this lagoon. The Catholic mission is established on Galley Island. The village Igongo is on the northern branch of the river.

Sette Cama.—The entrance to the river is 75 yards broad at low water and 120 yards at high water, being formed on the north by a wooded bank, and on the south by the sandy spit alluded to. The current runs strong.

Depth.—There is a depth of 23 feet on the bar, but it is subject to change.

Light.—About 4 miles southeastward of the entrance to Sette Cama River, from a white masonry structure on the beach near the middle of the settlement is exhibited a fixed red light, elevated 37 feet above high water, and visible 6 miles.

Dangers.—A rocky shoal, having a depth of 14 feet on it at low water, and which seldom breaks, is in the way of small vessels wishing to anchor close inshore; it lies with the lighthouse bearing 74° , distant 1,600 yards. Foul ground extends over 1 mile from the coast off the settlement.

Anchorage.—Vessels should not come inside a depth of 10 fathoms until the flagstaff on the beach near the northern factory is in line with the flagstaff on a small white house behind, bearing about 48° ; then steer in with that mark and anchor about 1 mile from the shore in $4\frac{1}{2}$ fathoms, mud. This is an inshore temporary berth, and vessels remaining the night would do well to move out to a depth of 7 fathoms, at about 3 miles offshore. There is always a heavy swell here.

Landing is generally very difficult, and should never be attempted in ships' boats.

The settlement, situated on the tongue of sand already mentioned, consists of two British factories, one on either side of the French Resident's house. The northern factory (Hatton & Cookson's) is white and conspicuous; both stand out clearly against the dark background of a cluster of large trees. There are also several French factories northward of the lighthouse.

Supplies.—A few vegetables can be procured from the Roman Catholic mission station, about 10 miles up the river. Fresh beef can be obtained from Messrs. Hatton & Cookson.

Signals by commercial code can be made with Messrs. Holt & Co.'s (the southern) factory.

Communication.—French vessels of Cie des Chargeurs Reunis leaving Havre call here regularly.

The coast.—From Sette Point the general trend of the land is southeastward to Banda Point, a distance of 126 miles, the intervening coast being low and wooded with high flat ranges inland. About 15 miles southward of Sette River is the northern beginning of a range of hills which run along the coast and form good marks for recognizing Sette River and Pedras Point, 12 miles to the southward of Sette Cama.

Pedras Point projects about 1 mile beyond the line of coast to the northward, and has several isolated sand hills bordering on a sloping beach southward, on the bank of the Massetche River or Lagoon, about 40 yards wide, which first trends northeastward and afterwards turning sharply southeastward rounds the southern end of the hilly range before mentioned. A bank of rocks and sand extends off the point for a distance of 2 miles in a southwesterly direction, and there are also said to be sand banks off its northern side, and to this circumstance the point probably owes its name. Vessels should give this point a wide berth, as it has apparently only been partially examined.

Vessels, if obliged to anchor in the vicinity of the point, should do so in from 9 to 11 fathoms, sand, which will be found about 7 miles off, for within these depths the bottom is rocky and foul.

Factory—Anchorage.—There is a British factory in the small bay about 1 mile northward of the point.

Anchorage can be had off it in about 7 fathoms, sand, but in approaching, the soundings will be found very irregular. The landing is bad, the canoes often upsetting.

Winds and currents.—The prevailing wind along this coast is from southwest, with a little variation toward the east in the morning; but during the month of May the wind blows steadily along the coast from the south and south by east, night and day, and a current may be expected setting to the northward at the rate of 1 mile an hour. At rare and uncertain intervals the current has been known to change and run to the southward for a day or two.

The coast.—About 9 miles southward of Pedras Point are the entrances, difficult to recognize, to two lagoons, Vevy the northernmost, and Badingo the southernmost; the latter extends to the southward parallel to the coast, from which it is separated by a narrow strip of sand, about 10 miles. Near its entrance is the village, a considerable number of huts, of Yeendji. From Pedras Point to Cape Mayumba the distance is 53 miles in a southeasterly direction, and the intervening coast presents a varied aspect. The shore is bordered by a narrow sandy beach, visible about 5 miles off, and within

the beach there rises a dense line of tall mangroves. In many places the land appears in three ranges; first the shore mangroves, then taller trees inland, and beyond, in the interior, a lofty range of hills with rounded summits.

The Santo Espirito Hills, situated a few miles in the interior, at from 15 to 25 miles southeastward of Pedras Point, form two remarkable table-lands, separated by a valley through which a stream appears to run. They are beautifully wooded, and on their southern side some spots, apparently grassy, are seen, but on closing the coast they appear quite barren.

Southward of Santo Espirito Hills there may be seen when near the shore in 10 or 11 fathoms some spacious clearings, which give to the country the appearance of being cultivated.

This coast is thinly populated; here and there fishermen's huts are to be seen.

Fish are very plentiful off this part of the coast.

Anchorage.—During June, July, and August, when dense fog prevails, vessels may take advantage of the bank of soundings which extends along the coast from Sette Cama to Mayumba Bay, and anchor on it.

Nyanga River.—The entrance to this river is 30 miles southeastward of Pedras Point; its entrance is about 200 yards wide, has an extensive bar, little water on it, and strong currents (1891). For about 4 miles it runs parallel to the coast, from which it is separated by a tongue of sand 300 yards wide. The depth in the channel to Mongo Nyanga Rapids, 16 miles upstream, where there are two British and one German factory, has been stated to be 21 feet, but the river is encumbered with tree trunks and the banks often submerged. Its tributary is the Noambi, 6 miles from the entrance.

The settlement, where there are two British and one German factory, is situated on the tongue of sand, $3\frac{3}{4}$ miles from the entrance. The villages of Tchissambo and Bouiti stand on the right bank of the river, $1\frac{1}{2}$ miles northeast and southwest, respectively, of the settlement.

Telegraph.—Nyanga is connected by telegraph with Mayumba.

About 10 miles southeastward of Nyanga there is a British and a German factory.

Cape Mayumba (Panga).—The shore gradually rises on approaching Cape Mayumba, which from the northward shows itself in three or four high saddle hills, known as the highland of Yumba, falling steep down to the sea to a small cliff of a deep-red color at the pitch of the cape, on the summit of which are several clusters of trees. There are some huts upon the northern front, and a German factory 1 mile northeastward of the cape. Coming from the southward it appears as a bold bluff, and the red patch in it is very remarkable.

From the pitch of the cape a rocky ledge extends 1 mile southwestward, and 5 miles offshore there are 13 fathoms, sand and gravel. At the foot of the high ground off the cape is a rock or small islet joining the land, southward of which is a creek where landing may be effected, and a little farther south the Panga (Yumba) River falls into the sea.

There is a British factory at $4\frac{1}{2}$ miles to the southward of Cape Mayumba.

Mayumba Bay is $10\frac{1}{2}$ miles across between Cape Mayumba and Matuti Point; the bay between recedes 2 miles, forming a tolerably regular curve with a fine sandy beach. Some hills rise from its inner shore to a moderate height and are well wooded; there is a wooded hill, at the foot of which the Mayumba River falls into the sea about 4 miles northeastward of Matuti Point.

Mayumba River.—This river carries the waters of M'Banio Lagoon to the sea; the lagoon, which runs parallel to the sea, is 4 miles long and has a mean breadth of about 500 yards. The entrance to the river is about 600 yards wide and encumbered by sand banks, on which at low water there is only about 5 feet water; and the channel is not always passable for boats. By landing on the beach about $2\frac{1}{2}$ miles north of Matuti Point the river may be reached, as the distance from the beach does not exceed 200 yards, and a light boat or canoe may be carried over and launched into the stream, where the seine may be used with advantage. There are plenty of fish in the river and oysters on its banks. Outside the surf is too heavy for seine hauling.

Mayumba Bay may be considered the southern limit of great rain, for to the southward the vegetation is less vigorous, and arid plains and naked hills begin to appear. The coast, indeed, presents evident signs of drought more or less intense, and these characteristics become more apparent on advancing to the southward.

Matuti Point, called Kuango by the natives, may be recognized by its rising into a hill with some huts on it visible from seaward; off the point a reef of rocks, some of which are above water, extend 400 yards.

Reef.—About 1,200 yards 323° from the point is the outer of two small islets or rocks, covered with bushes and surrounded by a reef 600 yards in extent. Between this reef and the point there is a deep-water passage, 600 yards broad, but it is reported to be impracticable and should not be used.

Light.—About 1,200 yards northeastward of Matuti Point, from a wooden pyramid at a height of 31 feet above high water, a fixed white light is exhibited, which is visible 6 miles.

The pyramid for the light is not very easily distinguished, but the resident's house and road leading to it, situated just above the light,

can be seen from some distance. The French flag is displayed from the residency.

Settlement.—There are French and German factories; the former is a European house with a white roof, the latter consists of two houses with a flagstaff between them. The settlement is not shown on the charts.

Tides.—It is high water, full and change, in Mayumba Bay at 4 h. 35 m.; springs rise 7 feet.

Directions.—At a distance of 15 miles westward of Matuti Point there is a depth of 23 fathoms. The depths appear to gradually decrease toward the coast, and the water is discolored for a considerable distance. In approaching Mayumba Bay from the northward, it will be requisite to pass at least 2 miles off Cape Mayumba, and in coming from the southward vessels should give Matuti Point a good berth, and pass outside the islets. The channel between the islets and Matuti Point is reported to be impracticable.

Anchorage.—The best anchorage for large vessels is with the islets in line 221° in 6 fathoms, mud; this position will be about $\frac{1}{2}$ mile from the inner islet, and the same distance from the shore; smaller vessels anchor closer in according to draft. Vessels may anchor on the line between the points of Mayumba Bay, in depths varying from 8 to 10 fathoms, brown sand. The holding ground immediately abreast the settlement (being mud) is reported to be better than farther south, where the bottom is rocky.

Mayumba Bay affords good shelter from southerly and south-southeasterly winds, but it is exposed to winds from southwestward; in the position first mentioned, however, the reefs around the islets break the sea, and lessen the effect of the swell which generally prevails in the bay. There is anchorage in about 4 fathoms, between Matuti Point and the northeastern islet, where vessels may lie more sheltered; but along this coast such shallow water is always objectionable for an anchorage, on account of rollers setting in.

Landing.—Ships' boats may probably at times be able to land on Mayumba Beach, but without a skillful crew used to working in a heavy surf it would be risky to attempt it. Surf boats are always available.

Inhabitants.—There are several villages among the trees near Matuti Point, but invisible from the sea, the principal of which may possibly contain 1,000 people.

Supplies.—Fresh beef can occasionally be obtained. Vegetables can be obtained from the French mission. No bread can be obtained. No coal is kept in stock.

Abundance of fish is to be procured, and especially shellfish, the lagoon abounding in oysters; these, with yams, form the principal food of the inhabitants, who are very poor.

Trade is carried on in ivory, dyewoods, wax, and gum, palm kernels, rubber, and wood.

Telegraph.—A land telegraph line passes through Mayumba, connecting the place with the Gabon, and thence with the general system.

Black Rocks.—About 6 miles southward of Matuti Point, and about 50 yards from the beach, is a black rock, about 5 feet above water, and about 3 miles farther on is a small islet, or large black rock, about 400 yards offshore; these rocks are based on a bank which extends offshore about $\frac{1}{2}$ mile.

Banda (Longo) Point.—From Matuti Point to Banda Point, called by the natives Muema Longo, the first projecting land to the southward, the distance is 37 miles, in a southeasterly direction; and between these points the sandy nature of the land gradually increases, with trees skirting the base of the hillocks. On Banda Point, which is low, is a large village with a British factory to the north and a German factory to the south of it, and the locality may be recognized by two lofty hills in the background in the third range, the summits of which, from their form, are known as the Paps of Banda. Two miles southward of the paps is another mountain with a rounded summit.

The bottom near Banda Point is thickly studded with rocks and coral reefs, which extend $4\frac{1}{2}$ miles to the northwestward, at which distance there is a depth of 20 fathoms. The anchorage is bad, and a good offing should be preserved on account of the irregular nature of the rocks. Plenty of fish may be obtained.

Antelope Shoal.—At the distance of 1 mile southwestward of Banda Point is Antelope Shoal with $2\frac{1}{2}$ fathoms water, on which the sea frequently breaks.

The coast.—From Banda Point to Kilongo Point the distance is 29 miles in a 135° direction; and between these points the coast, which is moderately high and wooded at its base, falls back and forms a slight indentation. It is better populated than the coast about Mayumba. About 2 or 3 miles southward of Banda Point is Tchibobo Point, situated between a river and a lagoon of the same name. Tchibobo Village is northward of the point.

Rivers.—Several rivers fall into the sea between Banda and Kilongo Points, the principal of which are the following: The M'Bia, 2 miles southward of Tchibobo Point; the Niabessa, $3\frac{1}{2}$ miles farther south, with the lagoon of the same name and the village of Sette. The river and lagoon of Mekoundji, in latitude $3^\circ 57' S$.

The river and lagoon of Conkouati, in latitude $4^\circ 01' S$. There is a depth of about 10 feet over the bar of this river, but it breaks for a distance of 600 yards. The entrance is about 50 yards wide. There

is a British, Portuguese, and Dutch factory here. It is connected by telegraph with Libreville.

The Numbi River is 3 miles northward of Kilongo or Tchitembo Point, and 1 mile southward of Tindjili, a remarkable red cliff with black rounded rocks at its foot.

Kilongo or Tchitembo Point is low, and marked by a single hill with a flat top; it comprises two points, Lenkonde and Kunda, surrounded by rocks which extend probably from $\frac{1}{2}$ mile to 2 miles offshore, and having from 1 to 2 fathoms water; there is moderately good anchorage in $4\frac{1}{2}$ fathoms, red sand and shells, northward of these rocks, in the cove abreast Kilongo River. The town of Kilongo is about 4 miles from the entrance on the left bank, in the midst of a parklike country.

Prometheus Shoal.—The western or outer edge of Prometheus Shoal, upon which there is as little as 6 feet water, and on which the sea at times breaks heavily, lies 7 miles northwestward of Kilongo Point, and about 4 miles offshore. There appears to be a passage with a depth of 7 fathoms between this shoal and the mainland.

In calm weather there is no surf or rollers on the shoal to give warning of its position, and as the water decreases very suddenly toward this danger, vessels proceeding up or down this part of the coast should not approach the shore into less than 9 fathoms.

Longebonda River, at 10 miles southeast of Kilongo Point, has very little water in it at the most favorable time of the year.

The coast.—From Kilongo Point to Kuilu River the distance is 23 miles in a southeasterly direction, the intervening coast is a sandy beach with mangroves, palms, and bushes behind, and in the rear of them low bare hills, on which are habitations, terminating in a high hill, known as Salomba Mountain (not charted), about 12 miles northward of Kuilu River. This part of the coast is not safe; the bottom is composed of sand and rocks, and the shore should not be approached within the depth of 9 fathoms. Further out, in 11 or 12 fathoms, the bottom is soft mud. There is a considerable outflow from the river, and the soundings northwestward of its mouth are very irregular inside 10 fathoms.

Kuilu River.—The Kuilu River appears to be a stream from 200 to 300 yards broad, and its entrance may be recognized by two small wooded eminences known as the Paps of Kuilu, and two white factories, the American on the right and the Dutch on the left bank of the river. The river extends across a flat country, which is thickly covered with vegetation and is often flooded, for a distance of 27 miles in a northeasterly direction from its mouth. The south point of the river is wooded and of moderate height, and may be considered the northern point of Loango Bay.

Along the coast, the Kuilu is celebrated for its trees, and it supplies all the factories in the neighborhood with wood, planks, and canoes.

The muddy waters of the Kuilu extend far into the offing, and from its color might lead to the idea that the vessel was passing over shoals.

Bar.—The river entrance is barred by a shifting bank of sand, on which the sea breaks heavily; and on which there is a depth of about 9 feet, but within which are depths of from 13 to 19 feet as far as the customhouse.

Mullet Bank is a narrow shoal ridge of hard sand and rock, about 16 miles in length, as defined by the 10-fathom line, parallel to the coast midway between Kilongo Point and Kuilu River, and 6 to 7 miles off it. The least known water, $4\frac{1}{2}$ fathoms, is near the center, and bears from the northern point of Kuilu River 267° , distant about 10 miles; around its edges the water suddenly deepens to 9 and 10 fathoms.

The coast—Aspect.—South of the Kuilu River the ground gradually rises as far as Loango. On the sides of the ravines are patches of a red color which may serve to identify the locality.

A little northward of Loango Bay are some red clay hills of moderate elevation, which are steep on their shore side, and marked with ravines or fissures which gradually decline to lowland in the center of the bay. These fissures form green lines separating the barren parts of the hill and, being dotted with palm trees, resemble hedges between cultivated fields.

Loango Bay.—About 14 miles 151° from the mouth of Kuilu River is Indian Point, a low projection forming the southwestern point of Loango Bay. The land at the head of the bay, which falls back about 3 miles, when seen from that distance shows a thick line of trees round the beach. Northward of the bay and a little distance inland is a flat-topped hill with precipitous shoulders, and just southward of the bay is a continuous chain of hills which decrease in height toward the southward.

Indian Point is low and wooded at its extremity, but a little inland it rises and shows some bare hills of a reddish tinge, between which the ravines are covered with vegetation.

Light.—From a brick lighthouse, painted white, on the extremity of Indian Point, at an elevation of 43 feet above high water, is exhibited a fixed white light, which is visible 12 miles.

A spit extends 2 miles northwestward from Indian Point, at which distance there is a depth of $4\frac{1}{2}$ fathoms. At $1\frac{1}{2}$ miles from the point the depth is but $2\frac{1}{2}$ fathoms.

No vessel, however small, should cross Indian Spit, as the bottom is rocky and uneven and the sea frequently breaks heavily upon it.

The flagstaff of the French station bearing 109° leads northward of Indian Spit.

Light.—At a little more than 2 miles eastward from Indian Point Lighthouse and near the cliff in Loango Bay, $\frac{1}{2}$ mile southward of the French station, a fixed red light of low power and hardly visible from the anchorage is exhibited from a white iron column at an elevation of 111 feet above the sea. (Unreliable.)

Flagstaff.—The French Government flagstaff, which is visible from a long distance, is situated near the cliff, about 550 yards 40° from the red light.

The Residence appears to the right and close to the flagstaff.

Tides.—It is high water, full and change, in Loango Bay at 4 h. 13 m.; springs rise $6\frac{1}{2}$ feet. The stream at the ebb runs out of the bay with considerable velocity, especially during springs.

Anchorage.—A good position for anchoring is in about 4 fathoms, mud, with the French station bearing 91° and Indian Point Lighthouse 190° . Vessels drawing 13 feet of water are somewhat protected from the swell by anchoring with the harbor light bearing 139° , distant 1.35 miles.

Vessels should not anchor in the southern part of the bay on account of the heavy rollers which come in from the sea.

In the stormy season, which begins in October, it is more prudent to anchor at the position indicated than further in, as the squalls, which are sometimes very violent, generally come from the eastward; and if a vessel parted her chain, or dragged, when occupying an inshore position, she would be in danger of drifting on Indian Spit. There is little chance of a vessel dragging if well supplied in ground tackle, the bottom being very tenacious.

Directions.—Approaching Loango Bay from the northward, having cleared Mullet Bank, bring the French station to bear 109° ; steer for it on that bearing until Indian Point Lighthouse bears 175° , when, the vessel being on the 5-fathom line, course can be altered to the southward for the anchorage shown on the chart. Approaching from the southward, do not stand into less than 9 fathoms, until the French station bears 109° , when proceed as above.

Settlement.—Loango is at present a small collection of houses and factories constructed on the hills above the lagoon. The aspect of Loango has considerably changed of late years. It is now the most important of the places on this part of the coast, and from it all the productions of French Equatorial Africa are exported. The native villages are $2\frac{1}{2}$ miles in the interior. There is a French Catholic mission (hidden by trees) southward of the factories on the eastern side of the lagoon.

Lagoon.—At the foot of the above-mentioned hills is a small lagoon of brackish water, separated from the sea by a narrow neck

of sand; the entrance to it changes and closes; it is only available for boats, which often have to be hauled across the neck.

Even at high water it is difficult for a whaleboat not knowing the banks of the lagoon to make the landing place situated below the factories at the northern end of the lagoon.

Landing can be effected in ships' boats, the beach being sheltered by the shoals extending from Indian Point.

Supplies are scarce; there is no beef, mutton, or poultry. During May, June, and July some vegetables can be had from the mission station. Fish in large quantities may be caught with the seine. The water is good and easily obtained by a surf boat. There are several springs within the lagoon, the best supply being at the foot of a factory half way up the hill, presumably at the northern end of the lagoon.

Communication.—The Elder-Dempster steamers from Liverpool every four weeks call outward and homeward. French steamers leaving Havre each month and Marseille every alternate month also call.

Rollers.—Even during the finest weather rollers are not infrequent.

Soundings.—The bank of soundings extends out considerably from the shore about the parallel of Loango Bay, the 100-fathom line being distant about 35 miles from Indian Point.

Conflict Bank is a small, rocky patch of $5\frac{1}{2}$ fathoms, about 200 yards in extent, lying in the northern entrance to Black Point Bay, and 3.2 miles 202° from Indian Point Lighthouse; between this patch and the mainland, distant 2 miles, there is the depth of 8 fathoms.

Black Point.—At a distance of 8 miles southward of Indian Point is Black Point, the southern boundary of a bay of the same name; it is long and low, with a dense mass of trees standing out abruptly into the sea, and terminating in a sandy point.

From Black Point a shoal which breaks occasionally extends in a northwesterly direction nearly 1 mile; it is steep-to on its outer edge, and beyond it for 1 mile the bottom is rocky and soundings irregular; an offing of 2 miles at least should be kept when rounding the point.

Black Point Bay falls back 2 miles inside the line joining its extremities. From Black Point the shore of the bay, fronting a well-wooded plain with high land at the back, on which is situated the Lubu clump, trends eastward for about $1\frac{1}{2}$ miles, then bends abruptly northward, forming the bay. The soundings in the bay are fairly regular, and diminish gradually from 10 fathoms to the shore.

A long lagoon fronting the southern side of the bay has its entrance, which is subject to change, in the middle of a low, narrow, sandy stretch of beach which separates it from the sea.

The Songolo River, on the eastern shore of the bay, is the outlet of a lagoon on the banks of which is the fishing village of Tiniambi.

Several villages are situated on the southeastern part of the bay, a short distance inland.

Prohibited anchorage.—In order to avoid damage to the submarine cable, anchorage is prohibited to northward of the line drawn 300° from the white pyramid situated about 700 yards to southward of the cable house.

Tides.—It is high water, full and change, in Black Point Bay at 4 h. 13 m.; springs rise $6\frac{1}{2}$ feet.

Directions.—When making for the bay from the southward, care must be taken not to confound Black Point with another point of similar appearance about 6 miles southward, known as False Black Point. It is therefore necessary to use extreme caution, especially as Lubu clump (about $6\frac{1}{2}$ miles northeastward of Black Point) is difficult to identify; but should the clump be recognized, and brought to bear 41° and steered for on that bearing, a vessel will pass northwestward of the shoal off Black Point, and when False Black Point is shut in, haul in and select an anchorage where convenient.

Settlement.—There is a French factory in the southern part of the bay, also several Portuguese factories.

Landing.—The landing is at the French factory, but as the entrance to the lagoon on which it stands is often closed, arrangements have been made to keep it open; boats can enter at high water and land at the station. In very fine weather landing can be effected in a ship's boat on the beach a little westward of the flag-staff.

Communication.—A monthly steamer from Liverpool calls en route to the Kongo.

A radio station has been established at Black Point. It is open to the public from 8 a. m. to 10.30 a. m. and from 2 p. m. to 4.30 p. m., but to regular mail steamers at all times. Call letters F. G. O. The two columns, painted red, constitute a good landmark.

Supplies.—Pigs, goats, poultry, fruit, and vegetables may be obtained, but occasionally some little time is required to allow the natives to bring stock from the interior. Fish may be caught with a seine; water can only be procured with great difficulty.

Rollers.—The remarks made respecting rollers in Loango Bay apply also to Black Point Bay.

Bank.—There are some doubts respecting the existence of a bank with 6 fathoms, marked on the chart about 5 miles southwestward

of Black Point. The British naval vessel *Conflict* passed over the position on several occasions without finding less than 14 fathoms over it.

The coast.—From Black Point the coast runs southeastward for a distance of 19 miles to the mouth of Massabi River, the northern boundary of Portuguese territory, and is moderately high and wooded, with a sandy beach and some prominent undulations. The beach, after passing False Black Point, is bordered by palms. At about 3 miles southeastward from the latter point, in latitude $4^{\circ} 54'$ south, there is a rocky bank which appears to extend off for upwards of $\frac{1}{2}$ mile, the depths varying from 5 to $2\frac{1}{2}$ fathoms, a little to the southward of which are some cliffs about 15 feet high. There is a French factory and some villages about 1 mile northward of the cliffs. The coast thence is a low narrow strip of sand, fronting the Malonda Lagoon, behind which are bare hills. A bar runs along the coast. Some breakers mark the northern point of Massabi River.

Massabi or Loemme River.—The river has a depth of less than 2 feet across the bar at its entrance and is about 65 yards wide. At 6 miles northward of the entrance is Grand Baffo or Kaio Lagoon, the channel being tortuous, it has then a breadth of 75 yards, a depth about 8 feet. There is a depth of about 2 fathoms as far as Chikambo, a distance of about 70 miles, and to N'Kula Mando, some 40 miles beyond; thence the depths gradually decrease to Kuele, where there is but 2 feet water in the dry season. The river is bordered by mangroves near its mouth, but a short distance up these disappear; thence by papyrus and small trees until above Chikambo; here the papyrus disappears, and the banks are bordered by dense forest trees from 150 to 200 feet in height. The river was much obstructed in 1886 by trees which had fallen across it, in one place extending over a length of 150 yards. It is navigable by steam launches of 3 feet draft all the year round as far as N'Kula Mando, about 110 miles from the sea.

The Massabi Lagoon is 4 miles eastward of the entrance.

The anchorage off Massabi is in $5\frac{1}{4}$ fathoms water, fairly good holding ground, with the Dutch factory flagstaff bearing from 58° to 41° , at about 1 mile from the shore.

Landing.—The best landing place is opposite the boathouse for the bar canoes. Ships' boats can not be employed.

Grand Baffo Lagoon (Kaio), about $2\frac{1}{2}$ miles in diameter and with a depth of about 2 fathoms, is about 10 miles up the Massabi or Loemme River. There is an important Dutch factory on its northeastern shore. The Foleba Lagoon is situated a few miles above Grand Baffo, but it is not so deep.

The stream is said to run out of the river at the rate of about 2 miles an hour in the rainy season, but it is probably much greater during the heavy floods.

Factories.—Massabi is a French station situated on the northern side of the entrance to the Massabi or Loemme River; this opening also leads to Chissambo or Bengo Lagoon. Massabi is the southernmost of the French stations on this coast; the boundaries of the French and Portuguese territories, which commence here, are shown on the chart.

Portuguese and Dutch factories are situated on the southern side of the entrance.

The coast between the Massabi and Chiloango Rivers, 8 miles southward, rises to hills of moderate elevation, North Hill 318 feet, and Chinchoxo Hill 240 feet high, being respectively $2\frac{3}{4}$ miles and $1\frac{1}{2}$ miles northward of the Chiloango, and about 600 yards inland.

Chiloango or Kakongo River.—The entrance to this river lies 8 miles southeastward from the mouth of the Massabi River; its waters discolor the sea for a distance of 7 miles offshore, in the depths of 17 and 19 fathoms; the position of the mouth is marked by red hills, which fall steep to the shore. The river trends south-eastward for a short distance from its mouth, and then turns inland; but little is known of its navigation.

The bar at the entrance is passable by steamers of small draft, but it is dangerous on account of the heavy surf.

The Chiloango, though probably 100 miles in extreme length, is but a narrow stream, and for the greater part of its course is only navigable for small steam launches. It rises in the Kongo State, and forms for a certain distance the boundary between that State and French territory, and then that between the State and the Portuguese strip; it enters Portuguese territory about 30 miles from the coast, and discharges itself into the sea just northward of Landana.

Its chief tributary is the Luculla, a similar narrow stream, which rises in the hills behind Boma, and after a course of some 60 miles joins the Chiloango at the point where this river enters Portuguese territory at Nzobe. At this place the Kongo authorities have a Government post and customhouse for controlling the imports and exports to and from the coast at Landana.

Dungu, on the left bank of the upper part of the Chiloango River, near the limits of the navigable channel accessible to small steamers, is being connected by a railway with Boma.

Shoal.—The French packet *Ville de Maceio* struck (1891) upon a shoal of sand and gravel lying opposite the village of Chinchoxo, situated about 3 miles northward of the Chiloango River, at a distance of about 2 miles from the coast; but its position is doubtful.

The least depth obtained was 13 feet. This danger lies in the way of vessels bound to the anchorage in Landana Bay.

Landana Bay, formed by a bend in the land, affords anchorage off the Chiloango River, and the village of Landana situated $1\frac{1}{2}$ miles to the southward. Landana is one of the largest factory stations on this part of the coast, and may be easily recognized by a remarkable white house with a flagstaff, and a conspicuous tree, both standing on a bluff southward of the village, elevated 279 feet above the sea. Landana is a great entrepôt for the produce of the interior, and is the market where all direct trade with the natives is transacted by the British, Portuguese, and Dutch of the various factories. There is a French missionary establishment here.

The English firm here is an agency of Messrs. Hatton & Cookson, the head firm being at Kabinda. They have about a dozen smaller agencies up the river and a small steamboat to bring down the trade, which consists principally of palm oil, palm kernels, rubber, wild coffee, etc.

Light.—From an iron pillar with stone base, on the northern side of the hill upon which are the resident's house and the conspicuous tree, there is exhibited, at an elevation of 111 feet above the sea, a fixed white light, visible 15 miles. The keeper's dwelling is conspicuous.

Anchorage may be taken in 5 fathoms, mud, with the conspicuous tree near the resident's house bearing 104° and the summit of Chinchoxo Hill 25° or closer in, according to draft. Inside 4 fathoms the ground is rocky. The small Portuguese gunboats anchor in 3 fathoms off Dutch House.

Landing—Supplies.—Supplies are very bad, and practically can not be obtained. There is no coal. The landing is most difficult, often impossible, and surfboats should invariably be used. The safest plan is to keep outside the surf and await the arrival of a large canoe, which the people on shore generally send off. These remarks also apply to Chiloango. When requiring supplies it is better either to proceed to Kabinda or anchor anywhere between Landana and Kabinda, when the native canoes will come off with pigs, goats, eggs, yams, and plantains.

Trade.—The exports consist of palm oil, kernels, rubber, ivory, and the imports of cotton prints, groceries, metals, tobacco, liquors.

Communication.—Elder-Dempster's steamers call monthly.

Landana Point, which is about 1 mile southward of the settlement, projects a considerable distance into sea and presents a bold bluff appearance. It is the most conspicuous headland on this part of the coast.

On rounding the southern point of Landana Bay at the distance of 1 mile, the depth of $2\frac{3}{4}$ fathoms was obtained with the point

bearing 142° . Between Landana and Malemba a vessel should not stand into less than 6 fathoms.

Malemba Point is situated at the distance of 10 miles southward from the mouth of the Chiloango River; it is the southwestern point of Malemba Bay, and consists of a grass-covered tongue of land, extending in a northwesterly direction from the base of some high red cliffs, studded with trees. A shoal, $1\frac{1}{2}$ miles in length and $\frac{1}{4}$ mile broad, extends from it in a northerly direction. The general depth on this tongue is 3 fathoms, but there is one spot nearly 1,800 yards from the point on which there is only a depth of 2 fathoms.

Malemba Bay.—The locality may easily be recognized by the abrupt red chalky cliffs, covered with vegetation, north and south of the bay. The small bay of Malemba is in form similar to all the indentations on the African coast south of the Equator, which fall back in a southeast direction, and are protected on their western side by a low tongue of land, prolonged into the sea by a shoal bank or spit. This peculiarity of form is probably occasioned by the combined action of the southwesterly swell and the prevailing current which flows along the coast from the southward. When coming from seaward these shallow bays are very difficult of recognition, as the low points, not being distinctive in character, are absorbed in the background, and this is especially the case in the appearance of Malemba Bay when viewed from the offing.

Inside the shoal off Malemba Point the breadth of the bay is $\frac{3}{4}$ mile, the depths being very regular, from $4\frac{1}{2}$ to 4 fathoms, hard sandy clay. Malemba Bay, though affording a snug anchorage for small vessels, is not adapted for vessels of large draft, as they are obliged to anchor farther out and thus become exposed to the heavy rolling sea.

Caution.—The plan of Malemba Bay is the merest sketch, and must therefore be viewed with suspicion.

Anchorage.—Large vessels generally anchor well to the northward of the bay in 5 or 6 fathoms, with Malemba Point bearing 154° ; but small craft, by going well into the bay, may lie in smooth water; and the mark for hauling southward, after rounding the spit, is the southern land just shut in by Malemba Point.

Landing may be effected in a cove within Malemba Point, and a small stream runs into the head of the bay, whence excellent water can generally be procured without difficulty, excepting near the end of the dry season, when sometimes it is nearly dried up.

Rollers are frequent and strong, especially about the time of springs; and they occur more often than not during calms, so that even small vessels are unsafe within the bank off Malemba Point (unless well in toward the head of the bay), where, during tornadoes,

or with heavy rollers, they are placed in circumstances very similar to what has already been described in reference to Loango Bay.

Malemba.—The town of Malemba stands near the margin of a cliff of red argillaceous earth, that rises abruptly from the seashore to an elevation of about 100 feet.

Climate.—The climate of Malemba, in comparison with other parts of West Africa, is very salubrious, owing to the dryness of the atmosphere and soil and the absence of those dense forests so common in other districts. The Europeans trading here have, in consequence, almost uniformly enjoyed good health.

Natives.—The natives are a mild, tractable, inoffensive people, but are extremely indolent; they are said to be somewhat unscrupulous respecting the appropriation of property.

Cascaes Point.—From Malemba Point the coast trends in a southerly direction 5 miles to Cascaes Point, the termination of the bold coast, which makes like a tableland of moderate elevation.

Southward of Cascaes Point, which forms the northern boundary of Kabinda Bay, the hills which line the coast disappear, and a low broad plain, studded with palm trees, extends as far as the mouth of the M'Bele River, which is distinguished by having a brighter color than the land whence it projects.

M'Bele River, which lies about 8 miles to the north by east of Kabinda Point, is a small stream forming the southern limit of the territory of Malemba and the northern boundary of that of Kabinda.

M'Bele Shoal.—From the southern point of the river, a shoal of sand and rocks extends in a westerly direction for a distance of $2\frac{1}{2}$ miles, having on its outer edge only $2\frac{3}{4}$ fathoms, but the sea does not break, excepting with the ground swell. It is therefore necessary to keep about 4 miles offshore when passing this locality and to keep the lead going in order to preserve a proper depth.

Anchorage.—On account of the rollers in Malemba Bay, ships which only require water frequently anchor southward of Malemba Point, in 6 or 7 fathoms, mud, about 2 miles from the shore, which is abrupt, with a narrow sandy beach. There is an excellent fall of water here. The chart shows what is presumed to be this anchorage, 5 miles southward of Malemba Point, off M'Bele River entrance.

Kabinda Point is low and covered with bushes, with some huts visible near its extremity. A shoal extends from the west and north-western sides of the point to the distance of 1,000 yards, and terminates at its northern end, off which, but close-to, are some rocks, and within them to the eastward is a convenient landing place.

Light.—From an iron tripod, painted red, erected on a stone base on Kabinda Point, is exhibited, at an elevation of 50 feet above the sea, a fixed red light, visible 7 miles.

Kabinda Bay.—This bay is formed within Kabinda Point, the greater part of it, however, is not available for anchorage, on account of shoal water. The range of hills extending from the northern bank of the Kongo terminates just southward of Kabinda, and assists in identifying the place.

From Kabinda Point the coast curves inward for a distance of 2 miles, forming a fine sandy beach, which then trends northward. The scenery in Kabinda Bay is composed of lofty cliffs, verdant hills, and deep luxuriant vales, while a great variety of trees, both in size and species, are dispersed in every direction, affording a pleasant aspect to the country. On the heights to the eastward of the Locola River are several scattered villages known as Vanate, and farther to the northward is the rounded Umbrella Point on the left bank of the small stream of Lolondo, whence the land, trending to the northward, gradually becomes very low in the neighborhood of the M'Bele River.

Pier.—There is a wooden pier about 50 yards long on the shore in front of the English factory on the southern side of the bay.

Shoal.—The 3-fathom line across the bay extends $1\frac{1}{2}$ miles from the head of its bight; and projecting from the center part of this line northwestward is a rocky tongue; the outer end, having a depth of $2\frac{1}{2}$ fathoms, on which rollers frequently break, is nearly 3 miles from the shore and 2 miles northeastward of Kabinda Point.

Caution.—It is reported that there is less water than shown on the plan.

Landing.—Landing in ships' boats can easily be effected near the British factory 1,400 yards eastward of Kabinda Point Lighthouse.

Buoys.—A large conical buoy, painted red, is moored in $3\frac{1}{2}$ fathoms, about 1 mile northward of Kabinda Point Light; it marks the edge of the bank off Kabinda Point.

There is also an inner conical buoy, painted red, marking the limit of the anchorage for the Portuguese gunboats. Ships drawing 15 feet may anchor comfortably near this buoy. This buoy is not to be depended on.

Tower.—Above the town, and close to a conspicuous round tree, a tower has been built of three stories; it was intended originally for a light, but is now to be utilized as a clock tower.

Tides.—It is high water, full and change, in Kabinda Bay, at 4 h. 35 m.; springs rise 5 feet.

The town of Porto Rico, or Kabinda, stands on the sides or summit of some elevated land, about $\frac{1}{2}$ mile within Kabinda Point; it can not be recognized when approaching from the northward, the trees having grown up in front of it. There is a British factory

(white house and flagstaff) $\frac{1}{2}$ mile eastward of Kabinda Point, which is a conspicuous object from the northward. At the southeastern corner of the bay, just northward of Locola River, is a Dutch factory, and on the eastern side of the bay are two other factories, British and Portuguese.

Population.—The numerous huts that skirt the bay in groups, and extend inland to the distant hills can scarcely be considered as forming a town, but rather an assemblage of villages, each under the control of a petty chief, but the whole subject to a king, whose capital is a large town about 6 miles inland.

In some respects the inhabitants of Kabinda resemble the Kroomen of the Gold Coast, as they readily engage themselves to serve on ship-board during the stay of the vessel south of the Equator and are very useful in loading and unloading ships. Their skill and enterprise is quite peculiar, while the payment required for their boats and personal services is almost nominal; they are generally preferred to the natives of neighboring localities as hired people.

Communication.—In normal times mails from England arrive each month by a Portuguese steam packet from Loanda, and also by a steam packet from Lisbon, calling at Princes and San Thome Islands. The homeward mail leaves each month for Loanda and direct to Lisbon. Kabinda is also the port of call for Elder-Dempster steamers leaving Liverpool.

Telegraph.—There is telegraphic connection between Kabinda and the Gabon (Libreville) by a land line passing through Massabe, Loango, Kuilu, Maryumba, Sette Cama, Fernand Vaz, Cape Lopez, and Sangatanga.

Coal.—No coal is kept in stock.

Supplies.—Good notice must be given to obtain beef; other provisions can not be obtained. Water may be got from the Locola River, but it is not fit for drinking purposes, though it could be used for the boilers. The bay abounds with fish. Small repairs to engines can be effected at the Portuguese factory.

Trade.—Palm oil and palm kernels form the principal articles for the export trade.

Directions.—When approaching Kabinda from the northward a vessel should not haul in for the bay until the British factory ($\frac{1}{2}$ mile within Kabinda Point) bears eastward of 165° , and when coming from the southward, not until the British factory bears 120° .

Anchorage.—The two bearings given above will clear respectively Mbele Bank and the shoals off Kabinda Point, and a vessel may safely approach Kabinda Point between these bearings, and anchor.

If the vessel be of suitable light draft to get under the shelter of Kabinda Point it is better to do so, as she will be more comfortable and probably safer in such a position. But if drawing too much

water for this, a vessel should anchor in sufficient depth to be outside the line where the rollers begin to feel the bottom and to accumulate a surface velocity.

The coast.—From Kabinda to the Kongo River, a distance of 30 miles, the country is particularly fertile, and has a most luxuriant appearance, with apparently a large population, as numerous canoes may be seen fishing off the shore. The land is generally low near the shore, but sometimes terminates in a cliff, while at a short distance inland may occasionally be seen a high and sloping ridge of beautiful park land, the valleys presenting a most picturesque aspect, abounding in groves of trees, among which the common palm is conspicuous.

From Kabinda Point the coast trends southwestward for 12 miles, as far as Red Point, and the shoal which surrounds the former point extends along the coast with a breadth of $1\frac{1}{2}$ miles, as far as Red Point. Some parts of this reef are generally marked with breakers. The coast between these points is low and fringed with wood, but a little in the interior, about 3 miles southward of Kabinda, the land rises to hills of a reddish color, which extend with nearly uniform height to the Kongo River. The termination of this ridge to the northward points out the locality of Kabinda.

These hills, of an argillaceous nature, burned by the sun and beaten by the rain, are very friable. Numerous streams descend from their summits during the rainy season and cut deep gullies in the sides. At the distance of 5 miles southward of Kabinda two of the hills are somewhat higher and nearer the shore than those around them, and are known as the Two Hills, but they are difficult to make out. Within this first line of hills, a good distance in the interior, is another range, and their distinct character becomes more apparent when seen from the southward of Red Point. Off this part of the coast a good offing should be preserved on account of the shoal which extends from it. At the distance of 5 miles off the depth is about 7 fathoms.

Red Point.—This point, which is in fact the northern point of the estuary of the Kongo River, is low at its extremity and covered with trees; it is hardly discernible from the westward, and difficult to identify from the southward, as the shore can not be approached sufficiently near to open it out, but it is prominent enough when seen from the northward if a vessel is moderately well inshore. The land rises within the point for a short distance to a small eminence known, on account of its color, as Red Mount, and near it there is a grove of palm trees resembling a plantation.

Rollers have been known to break in 7 fathoms off Red Point.

Landmark.—The Dutch factory of Ma Kamma, consisting of five white buildings, situated about 8 miles southward of Red Point and close northward of Vista, formerly a good landmark when

approaching the Kongo from the northward, has been reported to be obscured by trees.

The coast.—From Red Point to Bulambemba Point on the northern side of the narrows of the Kongo River, trends southeastward 22 miles, and the intervening coast, which is fringed with a narrow, sandy beach, exhibits nearly the same aspect as that already described. As far as Banana Creek, a little northward of Bulambemba Point, there is a range of hills of almost uniform height, bare in some places and in others covered with trees.

Along this shore there is to be found, at the distance of 17 miles from Bulambemba Point, the village of Ma Kamma, and at $9\frac{1}{2}$ miles from the point a narrow stream known as Mosquito Creek, which may be recognized by a remarkable grove of trees, known as Fetish Wood, on its right bank. At the distance of 3 miles from Bulambemba Point is a narrow tongue of land, called French Point, and in the space between the waters of Banana Creek and Pirates Creek join the sea.

Moanda Light.—A flashing white light, elevated 118 feet and visible 16 miles, is exhibited from a white stone structure erected on a bold point about 1,600 yards southward of Moanda.

Mona Mazea Bank.—This extensive shoal, the name of which signifies "little water," commences about 4 miles southward of Red Point and extends along the whole line of coast as far as the entrance of the Kongo River. In some places the 3-fathom line extends $3\frac{1}{2}$ miles and its 5-fathom curve $6\frac{1}{2}$ miles offshore; and from these lines the depths generally decrease gradually toward the shore, though in some places the depths are irregular and vary suddenly. As a rule the bank should be avoided on account of the almost constant swell and frequent rollers; the latter generally set in at full and change. Vessels, however, if under sail and the wind falls light, or should it be deemed necessary to wait for daylight before entering the Kongo, can find anchorage upon the bank.

The current from the river always runs strongly over the bank, so that without a commanding breeze sailing vessels become unmanageable, and cuts its way to seaward for many miles in the direction of the line of coast toward Red Point, leaving a space of comparatively slack water inshore to the northeastward. There is seldom any difficulty in working down from Banda Point to Kabinda by keeping in with the shore; the color of the water marking the Kongo stream soon shows if the vessel is too far out. Sometimes, though very rarely, the stream turns in upon the shore past Kabinda. When this happens it is said to run with tremendous force.

Shoal spots previously unknown have been found on the bank and beyond its supposed limits, and there is reason to believe that the

bank has decreased in depth and increased in extent since the last survey.

It has been reported that there is generally less water between Red and Bulambemba Points than is shown by the charts.

Ponta Makaya is a narrow reef projecting from the shore just southward of the shipping port of Vista. It extends a distance of $1\frac{1}{2}$ miles nearly to the edge of the 3-fathom line, which at this part bends in toward the coast.

Detached shoal.—A small detached patch of $2\frac{3}{4}$ fathoms lies inside the 5-fathom line at $6\frac{1}{2}$ miles 255° from Vista.

Lee, Pandora, and Vestal Patches.—The first of these patches, with $1\frac{3}{4}$ fathoms, lies about 1 mile outside the 5-fathom line and $7\frac{1}{4}$ miles 263° from Moanda Light, and about 10 miles northward from Padron Point.

The Pandora Patch, with $2\frac{3}{4}$ fathoms, is situated 2.8 miles 255° from Moanda Light and $1\frac{1}{2}$ miles outside the supposed 3-fathom line.

The Vestal Patch of 4 fathoms lies 265° $9\frac{1}{4}$ miles from Moanda Light.

Great caution should be exercised when in the vicinity of these shoal spots.

Kongo River, or Rio Zaire—History.—In 1482 Diego Cam set out from the Portuguese settlement of El Mina (Gold Coast) to continue the examination of the West Coast of Africa, and in doing so crossed the Equator and discovered the Kongo River, which obtained for the fortunate explorer well-deserved renown. On the southern entrance point of the river he erected in 1486 a marble column to commemorate the discovery, and hence the name of Point Padrao (Pillar), now corrupted into Padron Point, also known as Shark Point.

The Portuguese discoverer conferred the name of Kongo on the river from the name of the country through which it flowed, but he afterwards found that by the natives it was called Zaire (Portuguese corruption of Nzadi), and the two names since that time have been used indiscriminately by Europeans. It now appears that Zaire (or Nzadi) is the general appellative for any great river, like the Nile in North Africa and the Ganges in Hindustan, and that the native name of the individual river in question is Moienzi Nzadi, or the river which absorbs all other rivers. At the present time the natives simply know it as Nzadi.

The Kongo River is considered to be the second in magnitude of the African rivers, and is about 2,000 miles in length. It was first roughly surveyed for about 300 miles in 1793, but was more completely examined for the above distance by an unfortunate expedition which reached Isangila in 1816; the mouth of the estuary was

surveyed in 1825. All these surveys were made by officers of the British Navy.

Since then (1874-77), the Kongo has been traced from its source in Lake Bemba, or Bangweolo, by the African traveler H. M. Stanley; from which lake it flows nearly due north to the Equator, crossing it in longitude 26° east, falling over in its course seven cataracts, named the Stanley Falls; it then takes a westerly direction to latitude 2° north, then westerly to longitude 20° east, thence running to the southward and southwestward, descending 32 cataracts (named Livingstone Falls) within the distance of 100 miles, the last cataract (Tellala) being about 90 miles from the sea.

Between Stanley Pool, just above Livingstone Falls, and the Stanley Falls, there is navigable water for a distance of 900 miles.

A railway now runs from Stanley Pool (Leopoldville) to Matadi, 80 miles from the sea, and to which port ocean-going steamers can proceed and discharge their cargoes alongside the piers.

About 50 (1911) steamers (stern-wheelers) ply on the Upper Kongo, some as large as 250 tons, between Leopoldville (Stanley Pool) and Stanley Falls. A railway from Stanley Falls to Lake Tanganyika is completed as far as Ponthierville.

The estuary.—The mouth of this noble estuary, which may be said to commence at Boma, 50 miles from the sea, lies between Red Point on the north and Mouta Secca Point, which bears from the former point 168° , 25 miles; but 9 miles eastward of this line the entrance is narrowed to 6 miles between French Point on the north and Padron (Shark) Point on the south, and thence for a distance of 25 miles the lower course of the river trends about 75° .

The banks of this portion of the river, formed of alluvial deposits, are covered with dense vegetation, principally palms and giant mangroves; one species of the latter grows to a considerable size, with a straight stem sometimes upwards of 100 feet high, supported by an arch of roots, which rise as much as 20 feet from the ground. The spaces between these mangroves are filled with various kinds of trees of smaller growth. Above Kissanga this dense vegetation commences to disappear, low banks of coarse hippopotamus grass taking its place.

The country near the river is low and swampy, but at some distance inland may be seen on either side low ranges of hills 200 to 500 feet high, grass-covered, with occasional patches of wood.

Currents.—At the distance of 9 miles to seaward the surface water is still quite fresh; at the distance of 40 miles it is only partially mingled with that of the sea; while the discoloration caused by the fresh water has been known to extend 300 miles off, where the current also has been reported to be perceptible, so that ships going north or south should be prepared to make allowance for it.

The British naval vessel *Rambler*, in April, 1899, while proceeding from Fernando Po to Loando, encountered a northerly current of about 1 knot an hour from latitude 2° north, the water being of a dark olive-green color, becoming browner and of less density as the Kongo was neared, and immediately changing to normal sea-water color when the mouth of the river was passed.

The British naval vessel *Magicienne*, while passing through the Kongo stream 60 miles from the land, in January, 1898, found that the temperature of the air fell 4° and that of the sea 3° , the density of the water decreasing from 10 to 7. During the day the current had set the vessel 12 miles in a northerly direction.

The rainy season of the Kongo basin commences early in October and continues until the middle of May. The river is subject to two rises, that from August to December being due to the tributaries on the right bank, and that from March to the end of April being due to the tributaries on the left bank, the rise being greatest in December and April. The stream at this time is very rapid and bears along with it floating islands torn away from the numerous low islands and points of the river and covered with small palms and grass. Some of these islands are more than 100 yards in length and are dangerous to ships under way, but especially so to those at anchor; besides they frequently sweep away the buoys marking the channels. Small floating islands and débris of all kinds are met with far out at sea, and as far northward as Anno bon. Even in the low river season these floating islands occur in the river, but not of sufficient size to be dangerous.

The river brings down an immense volume of water which flows in a strong current, varying in strength with the seasons and the different parts of the river. In the low river season (June to September) the average rate of the current between Kissanga and Boma was found to be $2\frac{1}{2}$ knots, though in places it ran as much as $3\frac{1}{2}$ knots and more; in the high river season the average rate of the current in this portion is probably about 4 knots. Between Boma and Matadi the average current experienced in July was $2\frac{6}{10}$ knots, the strongest average being $2\frac{7}{10}$ knots between Musuko and Noki, and the least, $2\frac{4}{10}$ knots, between Noki and Matadi; although in this latter portion, while passing through the Devil's Caldron, the current was at times quite 6 knots; the low average in this portion must be accounted for by the effects of the numerous eddies and whirlpools passed through. In the high river season the average current above Boma is probably 5 knots.

It is said that in December in the Devil's Caldron the stream runs quite 10 to 11 knots, and 8 knots off Matadi; steamers of 10 knots speed have been known to be unable to get to Matadi in this month.

Undercurrents in the Kongo, etc.—The following information is the result of investigations made in the lower portion of the Kongo River by the commander of the British naval vessel *Rambler*, in September and October, 1899:

The observations appear to show that the fresh water of the Kongo extends from the surface to the bottom until the head of the deep Kongo reach just below Kissanga, when it encounters a body of salt water filling this deep gully. It then runs over this denser water with decreased depth and increased velocity, the layer of fresh water being deeper with the ebb tide and shallower with the flood, both decreasing the broader the river becomes, until, from being 3 to 5 fathoms deep just below Bull Island, it is only a few feet deep after passing Bulambemba Point.

The deep body of salt water is either perfectly still, or has a very slight tidal flow (two-tenths to half a knot per hour), up river with the flood and down with the ebb tide.

The nature of the bottom of the Kongo is invariably sand, or in places hard clay, until the deep gully is reached, when there is found everywhere a deep deposit of soft mud and decayed vegetable matter, another proof of the tranquillity of the bottom water.

While running a sectional line of soundings outside Banana Creek, the bottom was invariably mud, but on one single occasion, at a depth of 56 fathoms, although mud was brought up, there were signs on the lead that it has struck a hard substance, the arming was dented and the lead slightly marked.

The banks of the Kongo, the numerous shoals in the river, and the bottom itself were found during the survey to be invariably sand or hard clay.

Mud is only met with in the small creeks in the upper portion of the river; and on the banks in the lower portion as far as the mangroves extend, which is from about Kissanga downwards.

It appears that a very large proportion of the mud found in the lower part of the river in the deeper water is from the washings of the immediate neighborhood, which is a vast expanse of mangrove swamp, with an innumerable network of creeks drained at every tide.

The water of the river itself is found to be heavily charged with sand.

The great change of stream in a few feet of depth fully accounts for the difficulty in steering so often reported at the mouth of the Kongo. With good speed, and proceeding either directly against or with the surface stream, this is not much felt, but if broadside on to the current, and proceeding slowly, a vessel is at times almost unmanageable.

Vessels grounding on banks where the current is strong have had the sand piled up against one side of them nearly to the surface in a

few hours, and then a sudden swirl of current has washed it away and left them in deep water. It is stated that on grounding the anchor should never be let go; sooner or later the current will wash bank and ship together down the river until deep water is reached.

Level of river.—At Matadi there is a difference between high and low river of about 23 feet; at Boma of 9 feet; Fetish Rock of 7 feet; Mateva of 5 feet; and at Banana of 2 feet.

In 1899 the river was at its lowest in July and August; by the beginning of October it had risen $5\frac{1}{2}$ feet at Matadi, and about 2 feet at Boma. It is at its highest level in December and January.

Tides.—The tidal influence is sensibly felt in the river as far as Boma. It is high water, full and change, at the under-mentioned places as follows:

Banana Creek at 4 h. 0 m., springs rise 6 feet.

Malella at 4 h. 20 m., springs rise 5 feet.

Mateva at 5 h. 30 m., springs rise 3 feet.

Fetish Rock at 6 h. 0 m., springs rise $1\frac{1}{4}$ feet.

Boma at 6 h. 25 m., springs rise $0\frac{3}{4}$ feet.

Meteorology.—The following remarks taken principally from a report of "Le Congres National d'Hygiene et de climatologie medicale," Bruxelles, 1898, are based on observations made by Dr. Etienne at Banana and Boma during several years:

Seasons in the Lower Kongo.—The hot or rainy season begins generally during the first 10 days of October with some slight showers of short duration, separated by several days of dryness. Toward the end of the month or the beginning of November, they increase gradually in frequency and become heavy, being nearly always accompanied by electrical displays. The end of December is less wet than the beginning, and the "little dry season" lasts from then to the end of February, when the rains again become very heavy until the end of April, ceasing altogether about the middle of May; this change takes place almost to the day, every year, between the 13th and 17th, after which there is continuous fine weather. The wettest months are November, December, March, and April. The total quantity of rain varies much from one year to another.

The cool or dry season, which succeeds the wet season, is better marked. No rain falls, occasionally there is a slight mist or *caçimbo* for 5 or 10 minutes between 5 a. m. and 9 a. m., and the sun is almost invariably hidden by a thick covering of cloud. Grass fires commence about July 1, and last throughout the season.

Winds.—At Banana a light land breeze blows in the morning, at sunrise, between southeast and south, falling calm later on till about 11 a. m., when the sea breeze sets in from southwest, more or less strong, until 7 p. m. The winds are the same all the year round, but more marked in the dry season, being strongest in October and

weakest in July. Calms are most frequent in July and less frequent in March. The winds from southeast, through south, to northwest average about 80 per cent of the total winds observed.

The sea breeze works gradually up the river, its direction following the line of the banks. It reaches Boma as a light breeze about 2 p. m., and occasionally between 6 p. m. and 8 p. m. blows as quite a strong breeze for about an hour. At Matadi it does not begin till late in the afternoon and often blows fresh in the evening until about 10 p. m.

Tornadoes occur between November and the end of April, the rainiest months being the worst, but they are seldom of any strength in the Lower Kongo. In the Upper Kongo they are said to be very severe.

Fogs are extremely rare.

Temperature at Banana:

| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|-------------------------|------|------|------|------|------|-------|-------|------|-------|------|------|------|
| Mean daily maximum..... | 87 | 88 | 89 | 88 | 86 | 84 | 79 | 78 | 82 | 85 | 87 | 87 |
| Mean daily minimum..... | 74 | 74 | 75 | 74 | 73 | 68 | 65 | 66 | 69 | 72 | 73 | 74 |

The coolest months are from June to October.

The barometer is not of much interest, as, except for being a little lower during the hot season than in the cool season, it is only subject to the regular daily fluctuations.

Climate—Health.—The British naval vessel *Rambler* was in the Kongo from July 1 to October 16, 1899. During this time the weather was pleasantly fine and cool for the tropics, the sun was seldom seen, and the nights were almost invariably cloudy, rendering observations difficult. The highest and lowest temperatures observed were: July, 81° and 71°; August, 81° and 70°; September, 82° and 72°. No rain fell until September 29, when a heavy shower occurred in the early morning, lasting two or three hours, after which showers of light rain were of frequent occurrence in the forenoon, marking the commencement of the rainy season.

On one occasion (July 3) a thick fog was experienced at the mouth of the river between 7 a. m. and 10 a. m. Slight mists or *caçimbo* occasionally occurred in the early morning. The weather generally was hazy; this, coupled with smoke from the constant grass fires, rendered it difficult to see any distance up to September, after which the forenoons were usually clear until the sea breeze set in. The nights were always cool, and often comparatively cold in the early morning, making it very necessary to guard against chills when sleeping.

Mosquitoes were not numerous, but mangrove and other flies were very troublesome and venomous, on shore or among the creeks in the lower part of the river near Malella.

As regards health, no ill effects were felt from the climate during the time the *Rambler* was in the river, although the crew had been shortly before much debilitated by a severe epidemic of fever. Several cases of fever occurred, but all very mild and of short duration; these were probably caused by slight chills.

Clothing in the daytime should be light, but of such a nature that an even temperature can be assured. A sun helmet should always be worn between 8 a. m. and sunset. At night a blanket will always be found useful; as a rule, a very cold wind prevails in the dry season. What sickness there is on the Lower Kongo is almost entirely of a malarial nature. Black water fever is not very common at Banana or Boma, but more so at Matadi. Dysentery and intestine diseases are practically unknown, except in people who have acquired the disease at some other place, and are awaiting passage home.

Distilled water only should be used for drinking purposes.

French Point is the southern termination of Banana Peninsula, a narrow sandy spit 2 miles long, forming the western side of Banana Creek. The houses of Banana are white and cover the peninsula. The point is surrounded by Stella Bank, of sand, which extends 800 yards in a southerly direction, with deep water close to its southern edge, while on the western side the 3-fathom line runs out to a distance of $1\frac{1}{2}$ miles from the point. The outer edge of Stella Bank can be avoided by bearings of Bulambemba Point.

Light.—A fixed light, elevated 34 feet above high water and visible from a distance of 6 miles, is exhibited on the extremity of French Point. It shows white over the entrance to Banana Creek and red in other directions. For sectors see Light List.

There is a signal station at the lighthouse.

Banana and Pirates Creeks are the main outlets of a network of creeks extending to Malella, navigable for boats, and forming a convenient passage to avoid the strong current and rough water of the main river. Through them in former times slavers proceeded and thus escaped observation from cruisers at anchor on the southern side of the Kongo. Pirate Creek appears to be now closed except to boats, though the chart shows a depth of $3\frac{1}{2}$ fathoms. On the northern side of Banana Creek is the apparent termination of the range of hills, which now turn to the eastward parallel to the river, before alluded to as extending from Red Point; and from seaward these hills, which are about 400 feet high, appear to form the shore, which at their bases is covered with wood.

Banana Creek is the entrance port of the Kongo. Here all vessels call for pilots, coal, etc., and to lighten the ship if necessary before

proceeding up the river. Good anchorage can be obtained by vessels up to 19 feet draft.

Bar depth.—There is a depth of 17 feet on the bar at low water.

Buoys.—A black can buoy is moored in the approach to Banana Creek, 1.75 miles 267° from French Point Light. The entrance to Banana Creek is narrowed by shoal water to 100 yards, but is well marked by buoys, three black and one red, the black buoys being left on the port hand in entering and the red buoy on the starboard hand. Between the outer black buoy, which has a staff and cage on it, and the red buoy there is a depth of not less than 17 feet at low water springs.

As it is stated that these buoys can be depended upon to be kept in position, for a small-draft vessel there is no necessity for engaging a pilot to enter. Should, however, the buoys be out of place, or the signal be made for a pilot, which will be answered from the pilot-house, a pilot will come out between the hours of 6 a. m. and 5 p. m.

Tides.—It is high water, full and change, in Banana Creek at about 4 h. 0 m.; springs rise about 6 feet.

The equinoctial tides are about one foot higher, and should rollers occur on the coast at the same time, the greater part of the peninsula is under water. During the wet season the water is said to be from 1 to 2 feet higher than at any other time of the year.

Tidal streams.—There is a regular stream at the flood and ebb in Banana Creek, that at the flood running from $\frac{1}{2}$ knot to 1 knot, and the ebb $1\frac{1}{2}$ to 2 knots, in the dry season. The water is always brackish.

Settlement.—Banana Peninsula is occupied by the numerous buildings of the Dutch factory; here are also coal sheds and piers. Further northward beyond the lighthouse is the Kongo State Station, with the official residences, pilot house, hospital, barracks, etc.

Coal.—Coal is kept in stock, but not for sale.

Repairs.—Small repairs to machinery can be effected by the Dutch House at Banana, who construct their own lighters and boats, retube boilers, and make their own sails; they employ about 25 European artificers.

Supplies.—Fish of good quality can be obtained, and a limited supply of fowls, eggs, fruit, etc., brought by canoes from up the creek. Game is to be had in the vicinity, but generally at the expense of fever, but beef does not appear to be procurable. There is no water at Banana, but a supply of river water can be secured at Kisanga.

Radio.—A radio station has been established at Banana. It is open to the public from 7 a. m. to 11.30 a. m., and from 2 p. m. to 5 p. m., excepting on holidays, when it is open from 7 a. m. to 10.30

a. m., and 4 p. m. to 5 p. m. Call letters O. N. A. The station consists of two masts, painted white.

Communication.—Banana is connected with Boma and Matadi by telephone, telegraph, and radio.

Health.—Banana Creek has somehow acquired a very unenviable notoriety for unhealthfulness. This is probably true in common with the rest of the Kongo during the wet season, but during the dry season, May to October, at any rate, it does not appear to be unhealthful.

A fresh breeze blows from the sea the greater part of the day and night across the narrow strip of sand forming the southern portion of the peninsula, but higher up there are patches of mangrove swamp which would probably cause this part to be unhealthful. Vessels should not, therefore, unless compelled to do so, anchor above the Dutch factory if intending to remain the night.

Locally, Banana is regarded as the sanatorium of the Kongo; it is more healthful than Boma, and much more so than Matadi.

Directions.—After passing Padron Point (Shark Point) a strong current setting to the northwestward must be allowed for. Steer for Bulambemba Point until the buoys outside Banana Creek are seen, being careful to keep Bulambemba Point to the eastward of 105° in order to avoid the shoal extending from Stella Bank off French Point. When the three black buoys at the entrance to Banana Creek, or the leading marks (see below) are in line, steer to pass between the outer black buoy, which has a staff and topmark, and the red buoy. The best water will be found by keeping close to the black buoys. Occasionally with the ebb tide there is a set toward the western side of the entrance at the outer buoy, after passing which the stream will be found to run in line with the channel. When past the inner black buoy steer as necessary for a convenient anchorage. If intending to remain any time it is advisable to moor to avoid a foul anchor. It is not recommended to anchor above the Dutch House, as beyond that the sea breeze blows across several patches of mangrove swamp, instead of over dry sand as below the Dutch House.

Leading mark.—The left extremity of Huard Point, in line with the right extremity of a large triangular patch of wood on the range of hills behind, bearing 2° , leads through between the outer buoys, and this line can be continued until the southern point of Fishers Island is abeam, when alter course as necessary up harbor.

Pilots.—There are excellent Government pilots (European) to be obtained at Banana Creek, for the river up to Matadi. Local knowledge is absolutely necessary for ascending the river, as the banks frequently shift.

Banana Creek can be ascended in a boat for some 15 miles to Chimpeza, and a passage leads through to Malella. The channel appears to be everywhere clear and deep, but gets narrow in the upper portions. The creek runs along the foot of the range of hills before alluded to, and there are numerous villages and patches of cultivation along the summit of the range, as well as along the bank.

Northern shore.—**Bulambemba Point** is low but distinct, being distinguished by a clump of trees on its southern extremity, much larger than others near the same locality, while beyond is seen the low wooded plain of the river, intersected by numerous creeks.

From a distance of 18 miles northwestward of Bulambemba Point the low coast is just discernible by the line of trees, which are marked here and there by gaps, while southward the shore in the vicinity of Padron or Shark Point is easily recognized by its tall mangroves.

From Bulambemba Point the low broken shore of the northern bank of the river extends 9 miles to Bull Island, which appears to be a detached clump of trees close to the main shore.

Light.—A fixed light, elevated 57 feet above high water, is exhibited on Bulambemba Point, showing white over a portion of the river entrance, red over Banana Creek entrance, and obscured in other directions; the white and red lights are visible 13 and 10 miles, respectively. For limits of sectors see Light List.

Anchorage.—Steamers occasionally anchor to the eastward of Bulambemba Point when their draft of water is too great for them to enter Banana Creek, but the current runs strong. The anchorage is stated by the pilots to be opposite the first creek to the eastward of the point, in 6 fathoms.

A bank extends all along this shore nearly as far as Bull Island, and is reported to be subject to great changes. In the afternoon, when the sea breeze is blowing, the edge of the bank is plainly visible, and small power vessels can with advantage keep along it in about 6 fathoms, out of the strength of the main stream.

Southern shore—**Mouta Secca Point.**—This point is of moderate elevation, and when seen from the northward at a distance of 7 miles has the appearance of a cliff descending in a perpendicular manner to the beach. Above the cliff the land rises and assumes a rounded form, covered with a thick clump of stunted vegetation apparently of small brushwood, and hence the point is known to the Portuguese as Mouta Secca or Dry Thicket Point.

Light.—A fixed white light, elevated 39 feet above high water, visible 8 miles, is exhibited from an iron tripod on masonry base erected on the northern part of Mouta Secca Point. The keeper's dwelling is white, with two black horizontal stripes on the roof. (Reported unreliable 1913.)

Anchorage.—There is stated to be good anchorage 1 to 2 miles westward of this point, in a depth of 6 to 7 fathoms, out of the current, and useful to vessels making the Kongo at night.

Turtle Point.—At the distance of 3 miles northeastward of Mouta Secca Point is Turtle Point, a slightly rounded eminence covered with tall trees.

Turtle Cove.—Between the above point and Padron or Shark Point, a distance of $2\frac{1}{2}$ miles, the land falls back into a slight indentation known as Turtle Cove. Abreast the middle of the cove is a bank of soundings where the 10-fathom line extends 1,400 yards off-shore. This bank is well adapted for anchoring ground. There are several deep holes in it, into which care must be taken not to let go the anchor. Good anchorage may be obtained in 8 fathoms, with Bulambemba Point just open of Padron Point 82° and Breaker Point 226° .

The surface current here was found to run constantly to the westward, slackening up during the time of flood.

Padron or Shark Point is the northeastern termination of a low narrow point, distant from Mouta Secca Point 5 miles in a northeasterly direction, the shore between being considerably rounded to seaward, with its convex side toward the northwestward. A sandy shoal, with 1 and 2 fathoms water, extends 400 yards off Shark Point, but farther outside the depth increases quickly, and $\frac{1}{2}$ mile off in a northerly direction there are 25 fathoms. The point may be passed safely at a distance of 800 yards.

Light.—A fixed white light, elevated 26 feet above high water, visible about 7 miles, is shown from a post near a brown dwelling a short distance within the extremity of Padron (Shark) Point. It is a poor light and reported to be unreliable. By day a Portuguese flag is hoisted at a flagstaff when a vessel is in sight.

A pedestal about 15 feet high stands about 100 yards to the westward of the signal mast, and bears an inscription in Portuguese to the Portuguese navigator Diego Cam, 1486.

There is also a small burial ground, with inscriptions of British naval vessels from 1857, about 600 yards within the point, with a notice.

Supplies.—A plentiful supply of fowls and eggs can be obtained from the village at Padron Point.

Diegos Bay—Buoy.—This bay is not recommended for anchorage. A buoy, painted red, in $2\frac{1}{2}$ fathoms at low water, marks the edge of the shoal water in Diegos (San Antonio) Bay; it lies $2\frac{1}{4}$ miles southeastward of Padron Point. The current runs very strong outside the buoy.

Raphael Creek, up which is the Portuguese station of San Antonio, is 3 miles southeastward from Padron Point; vessels of light

draft use it. In 1902, steamers to the number of 84, representing 101,286 tons, entered the port.

Viva and Trade Creeks.—Two miles eastward of this is Viva Creek, which is apparently seldom visited. Trade Creek is $3\frac{1}{2}$ miles farther eastward, or $7\frac{1}{2}$ miles eastward of Padron Point.

Sherwood or Kimvika Creek.—About 2 miles eastward of Trade Creek is Sherwood Creek, $\frac{1}{2}$ mile broad at the entrance, with some small sandy islets in the middle of the channel by which it may be recognized. A shoal extends out off this creek for some distance, and the passage as far as the islets is apparently narrow and shallow, but inside these it becomes broader and deeper.

Sherwood Creek extends for 15 miles as far as Sumba, a trading station. About 2 miles inside the entrance a narrow creek leads up to Kimvika mission station (American Baptist), which is situated on some sandy high ground in the vicinity about 200 feet above the river.

Supplies are fairly plentiful in this district, and sheep can be procured from the interior, but they are dear.

Anchorage.—The best anchorage in this portion of the river is stated to be just to the westward of the entrance of Sherwood Creek, but caution is necessary in approaching it, as the 5-fathom line lies some distance off the shore, and the soundings inside this limit shoal very rapidly. It is advisable not to go inside 6 fathoms. The current here is strong, and the water rough when the afternoon sea breeze is blowing, but not so much so as on the northern side of the river.

Kafumbila.—Two miles eastward of Sherwood Creek is the settlement of Kafumbila (Portuguese), and on the hills above it a sanatorium belonging to the American Baptist mission. The chart shows an anchorage in about 6 fathoms off it.

Directions.—It is not intended to give minute directions for navigating the Kongo, as the channels are constantly changing, especially during the wet season, and the services of a pilot are absolutely necessary at all times. The river is well marked by buoys, which are frequently altered by the pilots as required; the buoys often wash under with the current, or are swept away altogether by the floating islands during the wet season.

In ascending the river all red buoys are left on the starboard hand, and black buoys on the port hand, but too much dependence must not be placed on the buoys maintaining their colors. On approaching Scotchman Head vessels keep close-in to the southern bank of the river, which is here steep-to, to avoid the shoal grown up in the middle of the river, the southwestern corner of which is marked by a black buoy.

Caution—Buoys.—The buoys are not to be depended on, as owing to the extremely strong current they often break adrift or

change their position. Missing buoys are sometimes replaced by temporary buoys not in accord with the general system.

Kissanga.—One mile above Scotchman Head are the factories of Kissanga, consisting of a number of large, well-built, conspicuous white houses. This was formerly an important trading station, with a Portuguese customhouse, through which nearly all the trade passed, but since the excessive high duties formerly imposed by the Kongo State have been done away with, Kissanga has become of little importance, and will probably before long be abandoned. Steamers occasionally call here and anchor off the end of the pier, but the current off Kissanga is particularly strong with the ebb, and it is not recommended as an anchorage.

A shoal with 9 feet over it is reported to have formed in the branch fairway opposite Kissanga, but the position is not stated.

Malella, on the northern bank of the river, $2\frac{1}{2}$ miles northwestward of Scotchman Head, is one of the Kongo State stations; there is also a British factory, a conspicuous white house. Steamers seldom call here, but it is probably the best anchorage in the Kongo, as the stream is comparatively moderate and the water always smooth.

Aspect.—The country all around is one huge swamp with innumerable creeks, and probably nowhere in the Kongo are the giant mangroves seen in greater beauty or size. The Government station here supplies Boma with a large quantity of timber and bamboos (as the mid-rib of a particular species of palm is called locally), used for building houses.

Rambler and other passes.—A clear and deep passage leads up from Bull Island to Malella, inside the Monpanga Islands.

There is another passage hitherto used before the last survey, outside the Monpanga Islands, marked by four buoys, but it is very narrow and has not such good water as is found in the Rambler Pass. From Malella there is a good boat passage through the creeks to Banana, avoiding the rough water of the river when the sea breeze is blowing.

Anchorage.—The anchorage is off the British factory, in from 5 to 7 fathoms, about 400 yards from the shore.

Upper Kongo.—At Kissanga the Kongo divides into two channels; that along the southern bank, formerly known as the Kongo Yella route, but now as the Fetish Rock or Portuguese Channel is the one at present in use. The bar just below Fetish Rock and that at Camoens Point are constantly being dredged in the low-water (dry) season.

The old passage along the northern bank, known as the Mateva Pass route, has not been used for the last six years on account of insufficient water. It is rather more intricate than the other passage, and was first used in October, 1899 for heavy-draft steamers.

The two channels unite again at Fetish Rock, which is $28\frac{1}{2}$ miles from Kissanga by the Mateva Pass route, and $31\frac{1}{2}$ miles by the Kongo Yella Route.

Depths.—The general depths in the Mateva Channel were from 4 to 8 fathoms, except in the turn of the channel abreast Hippo Island, where the chart shows $2\frac{3}{4}$ fathoms. The depths in this part of the channel are reported to be very shallow.

The depths in the Kongo Yella or Fetish Rock route vary from 10 to 4 fathoms, except in the passages southeastward of Bird Island and southward of Fetish Rock, where a dredged depth of 20 feet is maintained.

In 1911 there was 19 feet of water in the Fetish Rock Channel in March, 24 feet in December, and in other months 20 feet.

Mateva Pass route—Depth.—The least depth, according to the chart, on this route is $2\frac{3}{4}$ fathoms, but see remarks above.

Directions.—This channel is not now in use, on account of insufficient water; the directions are, therefore, not to be relied on, but are given as they were in October, 1905, as a general description of the passage.

When abreast the first house of Kissanga, the course should be altered to pass to the northward of the buoys marking the shoal ground to the westward of Grass Island, a low island of sand, intersected with creeks and sparsely covered with bushes and hippopotamus grass.

As soon as Lawrance Islets, which consist of four low sandy islets on Parker Patch on the northern side of the channel close to the mainland, are passed a course can be steered along the bank, which is here steep-to.

Ponta da Lenha.—On reaching the narrow channel between the mainland and Bulikoko Islands, Ponta da Lenha, about 6 miles above Kissanga, will be passed on the northern shore. Formerly a famous slave-shipping port with numerous European factories, it has been for many years abandoned, and only the ruins of the houses remain, covered over with vegetation. Here the water is deep close-in to the shore and the current runs strong.

Katalla.—Just above Ponta da Lenha is the small Government station of Katalla, situated at the mouth of another branch of the Kongo named Maxwell Channel.

Maxwell Channel leaves the main stream shortly below Boma, and passes behind Mateva Island, a distance of about 19 miles. The result of a sketch survey in a steamboat showed that this channel was narrow, much obstructed by sandbanks, and not navigable for anything over 10 feet draft.

N'Tunga Island, at the mouth between Katalla and Mateva Island, divides Maxwell Channel into two parts.

Sicia is a deserted station on Mateva Island opposite the northern end of N'Tunga Island. Steamers used to proceed up here and lie alongside the bank, but it has apparently shallowed up, as only 9 or 10 feet were found opposite the station.

Caution.—Care must be taken in passing the mouth of Maxwell Channel to allow for the strong current setting out almost at right angles to the course of the main river.

Bulikoko Island is low, covered with grass and bushes almost level with the water; it is intersected by creeks.

The channel.—After passing Ponta da Lenha the northern coast of Bulikoko Island should be kept aboard and steer to pass to the southward of the black buoy marking the extremity of the shoal extending out from Mateva Island. From this buoy shape course to pass close along the Mateva coast, passing to the northward of the red buoy marking the shoal tongue extending westward from Hippo Island, where the channel narrows to about 400 yards.

About 2 miles westward from the last-named buoy the vessel will be abreast of the Kongo State station of Mateva.

Mateva, besides being a Government station, is the headquarters of the *Compagnie des Produits du Kongo*. The company have about 4,000 head of cattle on the island, and are commencing to grow vegetables on a considerable scale for the supply of Boma and Matadi. Arrangements can be made here for the supply of beef and vegetables, which they will undertake to deliver by canoes. About 100 head of cattle a year are said to be lost through crocodiles, which are particularly numerous in this part of the river, and which grow to 25 or 30 feet in length. There is a pier and flagstaff here.

The aspect of the banks has now commenced to change, the dense vegetation of the lower portion of the river giving way to low banks covered with coarse hippopotamus grass and a few bushes, which get scarcer as the river is ascended; near Mateva the banks are more or less cultivated with maize, etc.

Hippo Island faces Mateva Island; it is composed of sand covered with grass and bushes almost level with the water, intersected by creeks and almost surrounded by sandbanks. Hippopotami abound, but, though their tracks are numerous, they are seldom seen in the daytime. About 4 a. m. is considered the best time to approach them, if it is thought worth while to risk the inevitable fever.

Shoal.—About 1,600 yards eastward from Mateva Pier a shoal with 2 fathoms over it extends 400 yards from the coast of Mateva Island.

Buoy.—This shoal is marked by a black buoy.

Creek.—One mile northeastward from the above shoal is the mouth of a creek, with a pilot station at its entrance; it is shallow across its mouth.

Day Rocks, with a depth of $1\frac{1}{2}$ fathoms over them, are on the edge of the shoal extending southward from Mateva; they are on the northern side of the channel, 1,600 yards northwestward from the northeast point of Bird Island.

Directions.—After passing Mateva steer to pass to the southward of the black buoy marking the shoal extending from Mateva Island, and from there mid-channel to the black buoy off the entrance to the Pilot Station Creek, when a vessel will be abreast a bar which is now reported shoaler, but which is marked by two black buoys on the northern side and two red buoys on the southern side; having passed between these buoys, course can be altered as requisite for Fetish Rock.

Kongo Yella Route, as the channel along the southern bank is called, is more properly the name given to that portion of it from the southern side of Bird Island to Fetish Rock.

This bank is densely covered with vegetation, with occasional openings of creeks, the principal being Hewett Creek and the creek leading to Lucalla, where there is a large town, while on the port hand are passed Grass and Bulikoko Islands (already described), low and covered with coarse hippopotamus grass and bushes and surrounded by shallow sand banks occupying the middle of the river.

Depth.—The least depth according to the chart on this route is $2\frac{1}{4}$ fathoms, over the bar on the southern side of Bird Island, but it is probably 20 feet, as the channel is being constantly dredged.

Monro Islands.—Seven miles above Kissanga the southern bank falls back some 2 or 3 miles behind Monro Islands, a mass of small islands densely wooded and intersected by innumerable creeks and boat passages. The channel passes northwestward of these islands. On the main shore behind the islands are numerous villages and patches of cultivation, and the country appears to be fairly well populated, the region of mangrove creeks being passed, and access being had to the high ground about 2 miles inland. These hills, 500 to 600 feet high, are apparently a continuation of the highland behind Kimvika Mission, but only now for the first time visible again since passing that part of the river.

Directions.—After passing Kissanga, vessels keep along the southern bank, at a convenient distance outside the numerous snags in their locality, to avoid as much as possible the current, which with the ebb tide is exceptionally strong off Spiteful Point and for some distance above.

The main channel of the river above the southeastern point of Bulikoko Island has shifted and now passes between Monro Island and the group of heavily wooded islands just northwestward, then between the two easternmost islands of this group, and finally joins the old channel again southward of Hippo Island. This part of the

channel is marked by buoys, which are constantly being displaced by the current.

Anchorage.—The British naval vessel *Rambler* found a convenient anchorage for this portion of the river, fairly well out of the stream and clear of the channel, in from 3 to 5 fathoms, southeastward of the east extremity of Bulikoko Islands. Here, as at all anchorages in the Kongo, when not actually secured to the bank, it is advisable to let go a second anchor and to moor if remaining any time, as although a vessel never swings, yet when the sea breeze blows strong up the river the ship is liable to ride over her anchor and foul it.

Bird Island, a wedge-shaped island, about 4 miles in length, is another low swampy island, occupying the center of the river, covered with grass and a few bushes; numerous creeks penetrate it, and it is a favorite resort for wild fowl.

The channel.—From the large red buoy off Camoens Point the channel is close along the southern side of Bird Island until the actual left bank of the river is once more reached at a Portuguese station on Palm Point, opposite the southern point of the island, between which the channel is 400 yards across. A black buoy marks the turning point off Bird Island.

Penfold Point.—From Palm Point the bank consists of low sand cliffs, with grass-covered plain behind, to Penfold Point, which is bold and $3\frac{1}{4}$ miles from Palm Point.

The channel, which is close along this bank, takes a sharp turn around Penfold Point. To the northward of this point the channel is narrowed to 150 yards, between a low islet and a ridge of rock running out off the point, clearly marked by a heavy overfall. Great care is necessary with a long steamer in making this turn, as in ascending the river the stream will be met on the starboard bow while turning to starboard.

After passing Penfold Point the channel is nowhere more than 200 yards wide and lies close along the shore. About 1 mile eastward of the point it makes a sharp bend to the northward. Care is necessary to allow for meeting the stream on the port bow while turning to port.

Fetish Bar.—At 1,600 yards below Fetish Rock is a bar forming the termination of the Kongo Yella route. It is of varying depth and appears to be formed of hard sand and clay in ridges (across the stream), with traces of ironstone. A channel of 20 feet has been dredged and well buoyed.

Tide pole.—There is a tide pole to show the depth of water on the bar below Fetish Rock. Just below the tide pole there is a patch of 15 feet.

Steamers frequently anchor off the tide pole for the pilot to examine the bar, which is ever changing, before crossing.

Fetish Rock is the termination of a ridge of ironstone, and used to be considered sacred by the natives in consequence of immense quantities of gum copal lying under the surface. It stands at the edge of a flat grassy plain and juts boldly out into the stream. Fetish Rock is a Portuguese Government station, the red-roofed house of which, perched on the top of the rock 100 feet above the river, gives it a most picturesque appearance.

Behind Fetish Rock are some low hills standing up out of the plain. There are a few scattered villages on this plain, which extends down the river to the mangrove swamps above Kissanga.

Jorgensen Rock.—The line of Fetish Rock is apparently continued under water, as a rock with two heads was found $\frac{1}{2}$ mile off it. Although nothing less than 11 feet could be obtained with the lead on account of the strong current, a small steamer drawing 8 feet struck this rock on one occasion, and it has accordingly been marked on the chart as a 6-foot rock. The position of the rock can generally be seen by the swirl of the current over it.

De Winton Rock is a dangerous rocky patch close off a point on the southern bank where the hills reach down to the river.

Horne Island is a low bank of sand with a few bushes on it, just above water, and has only been formed in recent years.

Selonga Island lies about 1 mile eastward of Horne Island; it is low and covered with grass.

Sacra Bakal Island, facing Boma in the center of the river, is only just above the level of the water, except at its eastern extremity, where it rises to a well-wooded summit 255 feet high.

Aspect.—Just above Horne Island is the eastern extremity of Mateva Island, which has formed the northern bank of the Mateva Pass route all the way from the western entrance to Maxwell Channel, a distance of 17 miles. Two small detached hills, 145 feet high, one with houses on the top, called Cul de Boma, show about 4 miles to the westward of this end of Mateva Island.

On the northern bank of the river hills rise from the water over 500 feet, and just northward of the eastern end of Mateva Island is a conspicuous monolith of granite close to the summit of a hill (Fingal's Shield), 540 feet high. Between the monolith and Mateva Island is the eastern entrance of Maxwell Channel, before referred to.

Current.—On approaching De Winton Rock the current will be found to be very strong, with numerous eddies and whirlpools, necessitating careful steerage. After passing this rock it will have a tendency to set away from the south bank owing to the volume of water from the branch of the river passing south of Selonga Island.

Directions.—At Fetish Rock the two routes of Mateva Pass and Kongo Yella reunite. Passing at a convenient distance to give Jorgensen Rock a good berth, the white houses of Boma will come in

view. A course should now be steered with a large tree on Selonga Island in line with the white house of Chinquengue factory (the right-hand house of Boma), or a single tree on the sky line of the ridge behind 65° . This leads midway between the buoy off the southwestern end of Horne Island and De Winton Rock.

After passing De Winton Rock it is advisable to borrow a little over toward the southern bank, on account of the current and the edge of the shoal water southeastward of Horne Island.

On approaching Selonga Island steer to pass about 200 yards off a rock, showing above water, close off the large tree before referred to. Government house, Boma, will now be seen, and kept in line with the port office flagstaff leads up the remainder of the channel to Boma.

Anchorage.—At Boma, vessels usually let go the starboard anchor, and then haul into the bank or alongside the piers, securing with hawsers. It is advisable to lay out a kedge on the starboard quarter, on account of the sea breeze blowing up the river in the afternoons. Close into the bank little or no current is felt in the dry season.

Piers.—There are two iron piers at Boma, a small one opposite the post office with 23 feet at its extremity, and the other opposite the port office with 17 feet at low water, alongside of which the larger steamers lie; but this latter pier is difficult of access, being close to a bank forming out of the Crocodile River.

Boma, the capital and seat of Government of the Kongo State, stands on the right bank of the river at a distance of 50 miles from the sea. This place was one of the greatest slave marts in the world.

The present Boma, which only dates from the year 1886, is a well-laid-out and cleanly kept town, pleasantly situated at the center of a semicircle of hills facing the river. It consists of two portions, viz, Boma Rive and Boma Plateau, the former being the business part of the town on the flat ground close to the river; and the latter a small hill at the back, 190 feet high, on which are the residences of the governor and government officials, hospitals, barracks, etc. A steam tram forms an easy means of communication between the two.

There are three hospitals at Boma, two of which are for Europeans and the other for natives. No bathing should be allowed, as alligators abound.

The land in the neighborhood is hilly and covered with coarse grass; there are several patches of swampy ground in and around the town, but by cultivation, drainage, and filling-in those parts which used to be overflowed every rainy season, much improvement has been effected during late years in the health of the place.

The United States is represented by a consul general.

Shinkikasse Fort, about 1 mile westward of Boma, is a strong work commanding the approach to Boma, with which it is in tele-

graphic communication. It stands 135 feet above the river. Just below the fort there is a conspicuous single tree on a hill 300 feet high. Large pythons are frequently killed in this vicinity.

Water.—Boma is supplied with water from the Crocodile River, pumped up to the top of the plateau and then filtered. Ships obtain their water from the Kongo, but it should not be used for drinking purposes without first being filtered.

Coal.—No coal is procurable here.

Imports and exports.—The principal imports are arms and ammunition, liquors, provisions, clothing, cotton and linen goods, railway iron, etc. The chief exports are rubber, palm oil, palm nuts, ivory, etc.

The greater part of the exports and imports pass through Matadi instead of Boma.

Repairs.—Small repairs can be effected at the Government works attached to the port office.

Population.—The population of Boma in January, 1903, amounted to 3,300, about 300 of these being Europeans.

Communication.—Before the European war mail steamers flying the Belgian flag run from Antwerp to the Kongo every fortnight. These vessels are those of the Compagnie Belge Maritime du Congo (British) and of the Compagnie Maritime du Congo (German). Portuguese steamers carrying the mails leave Lisbon every fortnight for Loanda, the mails for the Kongo being transshipped at Kabinda.

Monthly steamers run as follows, viz: British and African Steam Navigation Co., or African Steamship Co., the German Woermann Line, and the vessels of the French Ligne de la Cote Occidentale D'Afrique.

Telephone.—Boma is in telephonic communication by a land line with Coquilhatville on the equator, a distance of 745 miles, via Matadi, Tumba, Leopoldville, etc. This line is to be continued to Stanley Falls and Lake Tanganyika, and another branch to Redjaf, on the Nile. It is contemplated joining Boma with Banana, at the entrance of the river.

Telegraph.—Telegraphic connection with London is available by way of Brazzaville and Black Point.

Boma is connected by radio with Banana and several stations up the river.

A radio station has been established at Boma on an elevation to the eastward of Fort Shiriki Kassa.

Railway.—A railway from Boma to Dungu on the Chiloango River is nearly completed.

Supplies.—There are several shops at Boma where stores can be procured at fairly reasonable rates considering the distance from

Europe. Fresh supplies are more difficult to obtain. Vegetables are grown in considerable quantities for private consumption, but can seldom be obtained in the market. Potatoes and onions arriving by steamer may occasionally be procured at the shops. A limited amount of beef and mutton only can be obtained in Boma, but arrangements can be made with the *Compagnie des Produits du Congo* at the town of Mateva, Mateva Island, for the supply of both beef and vegetables; the supply of vegetables, however, is both limited and uncertain. Bread can be obtained.

Ledge.—There is a rocky ledge fringing the point immediately above Chinquengue; the current sets strongly over and past it.

Isle Rocca is immediately above Sacra Bakal Island (see p. 370), with a narrow channel between them. It rises at its eastern end to a hill 300 feet high, rocky and well wooded. On this island are monkeys, buffalo, and antelope.

The channel between these islands and the southern bank of the river is shallow, with numerous rocky patches and shoals.

Princes Island, the termination of *Rambler's* survey, is on the right bank of the river, from which it is separated by a narrow canoe or boat passage, about 3 miles above Boma. This island is used as an isolation station for contagious diseases.

Directions.—Leaving Boma, bound up the river, the only danger to be avoided is the shoal extending off Isle Rocca; its outer edge is marked by a large red buoy. Should the buoy not be in position, the northern point of Sacra Bakal Island, opposite Boma, kept in line 265° with Cul de Boma, leads clear of this danger.

The direction of the river here is southeastward; at Princes Island it makes a considerable turn and runs eastward.

Above Princes Island the character of the scenery undergoes a change; the river, previously broad and uninteresting, is now confined within narrower limits by high hills on either side, with diversified scenery and, for some distance, luxuriant vegetation.

Apparently there is considerable depth of water all the way to Matadi, a distance of 30 miles, and although there are several rocks well known to the pilots, and the currents and eddies are stronger than in the lower part of the river, there is not much difficulty in navigating provided the vessel has good speed.

Binda is a British factory on the right bank of the river 11 miles above Boma. There is said to be good anchorage close in to the bank.

From Binda the river lies southeastward, and 4 miles above Binda there is a small islet in the center of the river with trees on it. The channel lies between this islet and the right bank. Six miles above Binda there is passed on the starboard hand a rock in the middle of the river, which uncovers about 2 feet in the low river season. Two

(the chart shows three) small islets lie close in to the right bank nearly opposite this rock.

Current.—Between the above-mentioned rock and Musuko the current is exceptionally strong.

Musuko is 20 miles above Boma; there is a Dutch factory here. From this place the river makes a sharp bend to the northeastward to Diamond Rock, $3\frac{1}{2}$ miles farther on. Along the right bank above Musuko there is a chain of small islets and rocks, lying parallel to the shore.

Diamond Rocks cover at high tide, and steamers have been lost on them, but the pilots have a good clearing mark which they use in passing it. At Diamond Rocks the river bends again in an easterly direction to Noki on the left bank, $25\frac{1}{2}$ miles above Boma.

Noki is the principal Portuguese station on the Kongo; there are several factories and houses here. Steamers occasionally call and anchor close to the bank, but it is stated to be a very awkward anchorage to reach on account of a strong eddy close inshore.

Telegraph.—Noki is connected by telegraph with Loanda, where the Eastern Telegraph Co. is linked by cable with the world. It is intended to connect Noki with Matadi.

Anchorage.—There are several places known to the pilots between Binda and Noki where a vessel can anchor if required. The general rule in this portion of the river appears to be that wherever hippopotamus grass is seen growing down to the water's edge it is clear for vessels to anchor close in to the bank, securing with hawsers to the trees in the usual manner.

Frontier line.—The boundary line between the Kongo State and Portuguese territory starts from a point about 100 yards to the northward of the principal house of the Domingo de Souza at Noki, runs from thence about 115° for about 1 mile to the parallel of the Noki Residency, and follows this parallel as far as the Kuango River.

The Devil's Caldron.—Above Noki the river makes a sharp bend to the northward for about $2\frac{1}{2}$ miles to Underhill on the left bank, around which point it turns at a right angle for the last time to Matadi. Opposite Underhill the high hills on the right bank fall down in sheer precipices to the dark, gloomy basin of water 600 to 800 feet below. The river here is very deep and current violent, numerous eddies and heavy whirlpools necessitate special care in steering, and the greater speed that can be used the better. Although in the dry season it is not very formidable, it is said in the wet season in December to fully justify its name of "Devil's Caldron." The current then runs in places 10 to 11 knots, and vessels of 10-knot speed have more than once been unable to pass at that time, and so were compelled to turn back.

Underhill was formerly a station of the English Baptist mission, but the buildings are at present unoccupied, the mission having been removed to Matadi.

At Underhill the telephone line crosses the river from Shonzo on the opposite bank, by a single span 2,650 feet in length, of phosphor-bronze wire, the lowest part of the curve overhanging the river being 130 feet above the high-water level.

Matadi, which dates from 1885 as a transport station for the caravan route, and more particularly from 1890, when the railway was commenced to Stanley Pool, is situated on the left bank of the river, 30 miles above Boma and about 80 miles from the sea. This is the limit of navigation for ocean-going steamers, for immediately above, at Vivi, the rapids commence.

It is an irregularly-built town on the steep and rocky slope of the bank, with little or no attempt at streets or roads. Shut in on all sides by high mountains, it is very hot and extremely unhealthful in the hot season, there being an utter absence of all ordinary sanitary arrangements, and a large native population.

The population numbered (1903) about 4,000, about 250 being Europeans.

Piers.—There are two large iron piers opposite the railway station at Matadi, alongside which steamers lie and discharge cargo.

The piers have T heads, lying parallel with the river bank and the stream; each head is 110 yards long. The depth alongside the upper pier is from 30 to 33 feet, and alongside the lower pier from 17 to 20 feet. An additional 100 yards of berthing is under construction, connecting these two T heads, and further extensions of 110 yards are projected from the further ends of each.

Three large vessels can lie alongside this wharf on which several railroad tracks are laid. On account of stones at the lower end of this wharf, going alongside at that point is rendered dangerous at low water.

Rock—Buoy.—Nearly opposite the piers, a large buoy marks the position of a dangerous rock. No soundings have ever been obtained on it owing to the strength of the current, but two steamers are known to have struck on it.

Anchorage.—Vessels lie alongside the piers or close in to the bank, as at Boma. In the dry season there is very little current close in, but in the wet season it runs strong at the pierheads. Men-of-war will find it advisable to anchor a little lower down the river clear of the houses. A kedge is necessary on the port quarter, as the sea breeze blows strong up the river in the evening.

River level.—The top of the western iron pier was 24 feet 4 inches above the level of the river in July, and 1 foot above a high-water level on the wall of the Dutch factory, showing a difference of

level between two seasons of over 23 feet. On one occasion the water is said to have risen over the top of the pier. During the visit of the British naval vessel *Rambler* a slight regular rise and fall of about 4 inches was observed, but the observations could not be continued long enough to determine if this was really tidal influence or not.

According to the observations of the railway engineer, the river at Matadi is about 87 feet above the level of the sea.

Winds and weather.—The remarks for Banana apply equally to all that portion of the river as far as Matadi. Tornadoes are more frequent in the wet season at the latter place than lower down.

Railway.—Matadi is the terminus of the railway from Stanley Pool (Leopoldville), a distance of about 260 miles.

Telegraph.—Matadi is connected with Boma and Leopoldville.

A pulling boat can ascend the river as far as Vivi, about 2 miles above Matadi on the opposite bank, but great care is required and local knowledge necessary, as Vivi is almost at the foot of the rapids.

Vivi was Stanley's first station for his expedition up the river in 1876, and there are still the remains of a fort, etc. It was, however, found to be unhealthful and was given up for Matadi when the railway was commenced. From Vivi a good caravan route leads over the hills past the famous Yellala Falls about 10 miles farther up the river.

Winds and weather—General remarks.—Between Cape Lopez and the Kongo River, from October to April, the sea breezes are from south by west and southwest by south, and heavy squalls from southwest by south and west by south occur in December and January. From May to September the land and sea breezes are more regular; the latter at this time often set in from west by north and blow during the night south by west and southwest by south, and then the land breeze is only felt close to the shore.

Off the coast of Loango the alternations of the land and sea breezes are not very regular, excepting from May to September (inclusive): in other months the prevalent breeze from west to south varies very little from this direction. The land breezes along this portion of the coast are seldom strong and do not extend beyond 20 or 25 miles from the coast.

At the distance of 80 or 100 miles offshore the southwesterly winds become more regular, and in advancing to the westward they gradually veer around to the southward and eastward and imperceptibly unite with the southeast trade. A line drawn from about latitude 5° south and the meridian of Greenwich to latitude 20° south and

longitude 10° east and curved toward the coast may be considered as the general eastern limit of the Southeast trade.

Tornadoes.—The tornadoes on the Loango coast are not so violent as those in the Gulf of Guinea. They are usually strong gales of short duration from the eastward or southeastward, and then gradually losing force, veer around to southward and southwestward, from which quarter they sometimes recommence blowing. Occasionally, however, the tornadoes are very violent and render it necessary to shorten all sail; but they are invariably a long time gathering in the east or southeastward, and thus give timely warning to prepare for them. On or about the parallel of the Kongo River these tornadoes cease.

Monthly observations.—The following observations on the winds and weather of this part of the coast are from the remarks of various officers who have served on the west coast of Africa, and should be regarded as their individual experiences rather than infallible rules.

January.—Tornadoes are frequent near Cape Lopez, and the current often sets to windward, the heat gradually increases; this is the worst season of the year. The prevailing winds in this locality are from the south-southeast to southwestward.

February.—The land wind brings off rain, and the sea breeze often brings the foul weather back again; the weather generally is unsettled, occasional rain with threatening appearances. The sea breeze is so well to the westward as to enable vessels to lie along the land on either tack.

March.—The weather in March is much the same as in February, but in Loango Bay, in the beginning of March, several squalls from the northwestward, accompanied with heavy rain and thick, misty weather, have been experienced, as well as some gusts off the land, assuming a very threatening tornadolike appearance, but never much wind in them. The squalls from the northwestward were more frequent near the full and change of the moon, when a heavy swell rolled into the bay, but much broken by the reef.

April.—The weather gradually improves, becoming cooler and drier, but to the northward, about Cape Lopez, fair weather can not be expected before the middle of May.

May.—Toward the end of April and throughout the whole of May the breeze blows steadily night and day along the coast from about southeast by south.

About the beginning of May the weather becomes more settled, but the currents are unaccountably irregular, at one time running northward at the rate of 1 mile an hour, and in a few hours after none are perceptible; occasionally, and without any apparent cause, they run as strong southward, but the general set may be said to be northwest.

June and July, the "smokes" prevail all along the coast, with light land and sea breezes, varying from southeast by south to southwest by south.

The weather during the end of June and the whole of July is very misty and gloomy (with heavy dews at night), making it difficult to distinguish the land, even when close to it. The thermometer ranges between 66° and 72°. The winds during the months of June and July are frequently light from southwestward, west-southwestward, and even sometimes northward of west by south. For many days there is little or no land breeze, and the sea breeze is also light.

August.—In August the atmosphere is cool, and even raw in the mornings, with frequent damp fogs. The breezes are generally light and the water smooth, especially to the northward of Cape St. Catherine. Land breezes in the morning do not extend more than 20 miles from the coast, and 50 or 60 miles offshore the sea breeze is pretty constant. The sky is generally clouded and overcast, and observations difficult; it was remarked that the more dense the atmosphere the less the force of the wind, and that if at all clear the breezes (both land and sea) are much fresher. During the above-mentioned three months, as a general rule, the winds from seaward fell about sunset and the land breeze (if any) did not come off till 7 or 8 a. m., and then was so light as scarcely to be worthy of the name.

Toward the end of August the very heavy mists cleared away, rendering it less difficult to see the land, although occasionally there is heavy drizzling rain, accompanied with thick, misty, foggy weather.

September.—In September the weather becomes hotter, but the winds hang more to the westward and are fresher and steadier; drizzling showers are often experienced, especially near the shore.

Toward the end of the month the sea breezes became much stronger than for some months past, and frequently continued to blow during the whole night. Tornadoes from southeast by east occur, but are not violent.

October.—In October, the wind is still more westerly, and vessels sometimes lie along shore on the starboard tack.

There are occasional showers of rain, with dull weather, the sky being generally overcast till noon, after which it usually clears up and the sun comes out.

Off Capes Lopez and St. Catherine the breeze is fresh and sometimes even strong. In the latter half of the month the rains begin along shore, and light showers occur almost daily at sea, while the breezes and lee current both become stronger.

November and December.—Strong breezes off the land are sometimes experienced, though not often; they bring rain, thunder, and lightning, and are generally followed by a day's calm, or very

light winds. The ordinary winds become very variable, with unsettled weather, and strong uncertain currents. In December the weather becomes very sultry all along this coast.

The previous remarks will readily suggest to the practical seaman what course should be followed when sailing from northward to southward. Thus, excepting when the current is setting to the southward, the ship should maintain a good offing, and only approach the shore to take advantage of the land breezes which begin to blow at or a few hours before sunrise.

Currents.—The current immediately off the coast appears to be variable and irregular both in strength and direction. In some cases this appears to be due to the wind, as vessels have been set toward the coast during and after onshore winds. On the other hand, the change from one direction to the opposite is sometimes quite sudden and unaccountable, but it has been observed that this change is accompanied by strong land and sea breezes. For further remarks, see Chapter I.

Rollers.—A day or two after the new moon, from May to September, especially during the period of “smokes,” a very heavy swell sometimes sets in along the whole coast from latitude 3° south to latitude 15° south, and renders the open bays dangerous to remain at anchor in where the water is shallow. On such occasion it is generally calm, but the force of wind never exceeds a light breeze, and thus a steam vessel can readily shift berth and a sailing vessel easily warp outside the heavier rollers by means of a small hawser. It is better to ride with a kedge anchor and hawser, as a chain cable would be liable to snap.

During the season of the rollers, landing on the coast can only be effected by surf boats. Vessels should avoid anchoring (especially at the time of full and change) in shoal water; if they do so, they should be prepared to get away on the first indication of danger. The approach of the rollers is announced by considerable surf on the beach; the sea breaks on the headlands of the bays before any swell is perceived inside; while from the masthead there may be seen large waves in the offing, like ridges on the surfaces of the water. Along the whole coast, excepting in the bays where landing is easy, communication with the shore is always very difficult, and frequently impracticable for ships' boats, on account of the heavy surf breaking on the beach.

As a rule, vessels should not anchor on the open coasts in less than 7 fathoms, nor off Padron Point in less than 10 fathoms, on account of the swell, the undulation of which often assumes a very angry appearance when in a less depth of water; the swell gets up without warning, and is heaviest during the months of the South Atlantic winter, and at the full and change of the moon.

Bank of soundings.—The exact breadth of the bank of soundings has not yet been ascertained, but there is reason to suppose the depths increase regularly for many miles from the land. Along the coast the soundings vary from 7 to 10 fathoms about 3 miles off-shore, but inside this line many shoal patches may possibly exist.

Off Cape Lopez there is a depth of 40 fathoms about 20 miles from the coast, but similar depths may also be found close to the cape on its western side, while at 5 miles to the northward of the cape the depth reaches 76 fathoms. From Cape Lopez the bank extends further out on advancing to the southward, and off the Fernand Vaz River it attains a breadth of 25 or 28 miles, which it retains as far as Cape St. Catherine; thence it retreats from the coast, until on the parallel of Pedras Point the 100-fathom line is about 35 miles from the coast, and then would appear to run parallel to the coast as far as the bay of Loango, off which 100 fathoms are found at this distance offshore. The 100-fathom line also lies about 40 miles westward of Mouta Secca Point, but the uniformity of this line is broken off the entrance to the Kongo by a very deep channel 4 to 8 miles in breadth, in which there are depths of over 800 fathoms, running into and through the estuary of the river.

The prevailing nature of the bottom near the shore, as far as the depths of 10 or 11 fathoms, is mud; but farther out is found gray muddy sand, sand and gravel, and sand mixed with coral; this last kind of bottom is found more in the neighborhood of the Kongo River. It is only in some few places that the bottom is rocky, and care should be taken to preserve a good offing in such localities. Throughout the whole extent of the bank of soundings, the water shoals very gradually toward the shore, and, as a rule, vessels can coast along the land from 2 to 3 miles off, without fear of danger, and anchor in any suitable depth.

Temperature.—The temperature of this part of the coast is stated to be much lower than in the Bight of Benin.

CHAPTER IX.

MOUTA SECCA POINT TO GREAT FISH BAY.

General remarks—Aspect.—From Mouta Secca Point to Dande Point the distance is about 154 miles in a southerly direction. The intervening coast is unusually straight, but it recedes 13 miles to the eastward from a line between the above points into Funta Bay. The land throughout is of moderate elevation, though higher than that treated of in the preceding chapter, and is in some places wooded, while in others the bare hills are crowned with isolated clumps of trees. It also becomes more rocky at its base and in some places presents reddish cliffs, surmounted inland, chiefly toward the south, by a range of hills. The soundings along this portion of the coast are also less regular, though, excepting in certain places, the shore is generally safe.

The coast.—About 3 miles to the southward of Mouta Secca Point red cliffs commence and extend to the southward for many miles, and inside them is a table-land running parallel with the coast and forming a continuous double-land, which is easily recognized when once seen, although the sameness of the unbroken red cliffs bordering the sea as far as Snakes Head is so great that no definite landmark is to be seen.

Cape Deceit.—At the distance of 20 miles 149° from Mouta Secca Point is a slight projection known as Cape Deceit, which probably derives its name from the fact of its reddish cliffs being mistaken for Mouta Secca Point.

Margate Head.—From Cape Deceit the coast curves gently inward and forms a bay, the southern point of which is Margate Head, just northward of which is Cabeça de Cobra factory. This point, situated 8 miles from Cape Deceit, forms a round projection with a rocky base. It is crowned by a moderately high hill, and from it commences the highland, which continues nearly as far as Bahia Fonda (Funta Bay), 33 miles to the southward. As extensive shoal projects 2 miles from Margate Head and the coast 2 miles to the southward and assumes the form of a triangle, with 3 fathoms water at its apex.

On this shoal there are several heads, one of which is Hydra Bank, with only 6 feet water.

Vesuvius Shoal, with a depth of $2\frac{1}{2}$ fathoms over it, is about 3.3 miles 232° from Margate Head; as defined by the 3-fathom line is it 600 yards in extent. There is a channel 2,200 yards wide, with from 4 to 5 fathoms in it between this shoal and that extending from Margate Head.

Mangue Grande.—From Margate Head the coast again falls back into a sandy bay, with a rocky headland near its center, which terminates southward in a point moderately high. This point marks the entrance of a river, about 1 mile northward of the south point of the bay, which is 10 miles distant from Margate Head, and is known as Mangue Grande. This latter point shows some lofty cliffs, surmounted with shrubs and overlooked by a hill, the top of which is rounded and bare. Within Mangue Grande Point is a most remarkable clump of mangroves, which can be seen from seaward for a distance of 15 miles, and serves to point out the position of the factory, a little southward of it, known as Massemodom.

Two miles southward of Massemodom factory is the village of Mangue Grande, between which places shoal water is said to extend for a distance of $2\frac{1}{2}$ miles from the shore.

Reported shoal.—A spot with $2\frac{1}{2}$ fathoms has been reported to exist, about 5 miles from Margate Head and Mangue Grande Point, and about 3 miles westward from the rocky headland, in the middle of the bay south of Margate Head. This shoal, if it exists, is surrounded by depths of 5 fathoms, and caution should be exercised when navigating in this locality.

Vessels should not shoal under 8 fathoms in this vicinity.

Snakes Head.—The slightly salient point between Mangue Grande Point and Mangue Grande, and marked Snakes Head on the chart, is very indistinct in itself, and only recognizable by the adjacent clump of mangrove trees.

The coast.—From Mangue Grande Point the coast trends south-eastward $22\frac{1}{2}$ miles to the northern point of Funta Bay or Bahia Fonda, the shore between presenting an uninterrupted sandy beach for a distance of 16 miles. Behind this beach may be seen some rocky cliffs overtopped by bare rounded hills. About $6\frac{1}{2}$ miles north of the bay the sandy beach is interrupted for some miles, and the cliffs approach the water's edge, but soon after the sandy beach reappears, and continues as far as the northern point of Funta Bay.

Between Kinzao and the point northward of the entrance to Funta Bay, shoal water is said to extend 1 mile from the shore.

Factories.—There are two Portuguese factories at Kakongo, at the foot of a hill, 11 miles southward of Snakes Head; they are not easily discernible. A short distance southward there is a clump of trees. Five miles southward of Kakongo are the factories of Kinzao, two of which are whitewashed: and 5 miles southward of Kinzao,

and 4 miles north of Moculla, is Missanga factory; good water may be obtained here.

Funta Bay.—The bay is not deep and affords no shelter, being open to the southwestward, and thus exposed to winds from seaward. The Lelundo River runs into it, the entrance of which is indicated by some clumps of trees close to the beach, and off which shoal water appears to extend nearly 2 miles.

Depths of $2\frac{3}{4}$ fathoms were found all around the northern point of Funta Bay at the distance of 200 yards, increasing regularly toward the offing.

Shoal.—There is a shoal about 9 miles in length and $2\frac{1}{2}$ miles broad with a depth of $4\frac{1}{2}$ fathoms on it, lying parallel to the coast off Funta Bay. This shoal was crossed with the factory northward of Moculla bearing 89° , when the least water obtained was 8 fathoms, but discolored water was seen to the southward.

Moculla.—About $\frac{1}{2}$ mile southward of Lelundo River are the four white factories of Moculla, where good water and occasionally fresh meat and vegetables may be procured. In approaching Moculla, inshore of the above-mentioned shoal, the water should not be shoaled to less than 5 fathoms until the factories bear 85° , when they may be steered for, and a berth taken in about $3\frac{1}{2}$ fathoms. There is a depth of 3 fathoms close in to the factories.

Landing is difficult at Moculla during the months of June to September, and must not be attempted in ships' boats.

Communication.—Steamers of Elder-Demster Co. from Liverpool (monthly) call on their return voyage.

The coast.—From the entrance of Lelundo River the coast trends southward for 16 miles, and for a distance of 8 miles presents a sandy beach, after which low rocky cliffs reappear as far as the river's mouth. These cliffs are intersected by ravines, probably the beds of torrents, and assume a yellowish-red appearance, contrasting strongly with the blue tint of the sea and with the verdant level of the country behind them.

A little inshore of the northern end of these cliffs is a moderately high hill, known as Funta Mount, with some low trees on its summit; it is the last prominent elevation rising above the line of coast as far as Couza River.

Couza River may be recognized by the tall trees at its entrance, especially on the right bank of the river, known as Palmas Point; and their dark hue contrasts strongly with the yellowish tint of the cliffs on the left bank. The entrance is skirted by breakers, which run out about 600 yards; and southward of the river the low cliffs again appear, but less elevated and flat, with some thick clumps of trees sprinkled on their level summit. Eastward of the river mouth is a group of hills, the highest and southernmost being Couza Hill.

The entrance into Couza River is only available for small, native flat boats.

Ambrizette.—This factory station, consisting of five or six warehouses and a number of native dwellings, is situated about 2 miles southward of Couza River, on the rising land stretching toward the Foreland Bluff. Coming from the southward the factories are not seen until they bear about 30° . Ambrizette is the outlet for the ivory trade. The ivory road starts from Stanley Pool, passes through Sao Salvador, and debouches there.

Shoal.—There is a rocky shelf with 3 fathoms on its outer edge, extending $1\frac{1}{2}$ miles seaward between the harbor light and the bluff.

Anchorage.—The best anchorage is off the river in 5 fathoms, with the British factory bearing 120° . Southward of this line the bottom changes from sand and mud to rock and stones, and shoals considerably. The ocean swell is uninterrupted, causing vessels to roll and making the anchorage uncomfortable.

Landing.—Owing to the constant heavy surf landing is only practicable in native surfboats. The surf is heaviest from May to October, and attains its maximum two or three days before springs.

Supplies.—A small supply of stock can be obtained by giving notice, and good water may be had some distance up the river.

Communication.—The steamers of Elder-Dempster Co. from Liverpool (monthly) call on their return voyage, and those of Empresa Nacional Portuguese Co. on their return to Lisbon three times a month.

Foreland Bluff.—This headland lies about 5 miles southward of Couza River, and is a high and almost perpendicular cliff covered with herbage, projecting seaward when seen from the southward, and in clear weather can be recognized at a distance of 15 miles, but less prominent when viewed from the northward. Within the headland rises a group of hills, the southernmost and highest of which, from its flat summit, is known as the Table of Juma, and is not only the best mark for the locality, but may be easily recognized from a distance of 25 miles. In passing the bluff, keep an offing of $1\frac{1}{2}$ or 2 miles to avoid the shoal extending about 1 mile from the shore.

Light.—A fixed white light, elevated 78 feet above high water, visible 12 miles, is exhibited from an iron standard on a white stone pedestal erected near the extremity of Foreland Bluff.

Juma Bay.—Southward of the bluff the land falls back into Juma Bay, a slight indentation, 5 miles wide between its points, with a sandy beach, nearly 3 miles long, on its southern part, the northern portion rising in cliffs of an unbroken character to Foreland Bluff. The Ambrizette River falls into the northern part of the bay; it is $\frac{1}{4}$ mile wide at its entrance, which is, however, barred with sand, like most of the rivers on this part of the coast.

The neighborhood of Juma Bay abounds with fish outside the depth of 9 fathoms, the best depth for fishing being 18 or 20 fathoms, coral and gravel.

Anchorage can be obtained in Juma Bay, in various depths, but it is not good, the ground being foul, while a heavy swell is generally setting in, causing much surf on the beach. Landing can not be effected with a ship's boat, which should be kept at the back of the surf until a canoe comes off.

Caution.—Between Mouta Secca Point and Foreland Bluff, a distance of 80 miles, the water is shoal near the shore, and the depths of 4 to 6 fathoms extend a long way off. Great caution, therefore, is necessary, and the hand-lead should be in constant use when approaching or proceeding along this part of the coast, as there may be shoaler water than the charts show, and when in shallow water rollers often come on without warning. Rollers frequently break off Ambrizette in 5 fathoms.

The coast.—From Juma Bay the general direction of the coast is 165° and the shore is bold, with from 8 to 10 fathoms water at 2 and 3 miles offshore. The shore consists of high white tree-crowned cliffs, forming a serrated outline at their base, with sandy coves between.

Double-headed Cliff.—At the distance of 14 miles southward of Juma Bay is Double-headed Cliff, a slightly projecting point, near the northern point of a small bay, shores of which are low, but at its southern point the cliffs rise abruptly to a considerable elevation, and are distinguishable by a cross erected on their summit.

Mussera.—To the southward and in the vicinity of Double-headed Cliff are four French factories named Mussera, off which the shore is foul for a short distance.

To the northward of Mussera, $\frac{1}{2}$ mile from the shore, is a shoal which dries at low water.

Communication.—The steamers of Elder-Dempster Co. from Liverpool (monthly) call on their return voyage.

Anchorage.—Vessels should not anchor off Mussera in less than 9 fathoms, which depth will be found at about 2 miles offshore. Inside this depth the bottom is rock. From the anchorage the Pillar of the Ararat Hill bears 115° .

Ararat Hills.—Inland, and a little to the southward of Double-headed Cliff, commences the Ararat Hills, which run parallel with the shore for a distance of 5 or 6 miles. They are of basaltic formation, steep, and, save a little brushwood, are without vegetation; on the summit of the northern peak, about 4 miles inland, is a remarkable column of granite.

The Ararat Hills are the highest elevations between the Kongo River and Loanda, and would be very beautiful were it not for their

brown, arid appearance, for the country is open and adorned with detached groves, while superb masses of rock rise from the ground in the most picturesque form.

Granite pillar.—The lofty granite pillar on the Ararat Hills, already alluded to, is of natural formation, though from the sea it has the appearance of being an artificial erection. It is very conspicuous from seaward, whence it may be seen 18 or 20 miles, and is therefore an excellent landmark for this part of the coast.

The pillar, about 60 feet in height, including the stone on which it rests, is the chief landmark about here and is situated 11 miles northward of Kiusembo and about 4 miles inland. All the neighboring hills are covered with huge blocks of the same kind of stone, viz, a pink kind of granite, extremely hard, consisting chiefly of feldspar, a little clear quartz, hornblende, and very little mica.

The coast.—At the distance of 6 miles south of Double-headed Cliff, the cliffs, which are more or less continuous from Juma Bay, terminate and are succeeded by a sandy beach for 4 miles, while beyond, at the distance of 2 miles, is the Doce River.

Between Mussera and Kiusembo there is a depth of 8 fathoms 1 mile from the shore.

Villages.—On the southern slope of the Ararat Hills, and a short distance inland, stands a village belonging to the Portuguese, while a little to the southward, abreast the sandy beach already referred to, is another village. This latter village stands 2 miles to the northward of the Doce River and is very conspicuous from the fact of the conical-shaped houses being much lighter than the dark trees in the background. The land in this locality is of a yellowish hue, and contrasts strongly with the green country to the southward of the Doce River.

Two-tree Point, situated 11 miles southward of Double-headed Cliff, is a low, sloping grassy point, with two most conspicuous palm trees, one near the point, the other about 300 yards further inland. There are no other trees near.

Doce River is apparently an insignificant stream, and appears partially barred by sands; the northern point of the entrance is low and wooded. The river enters the sea just northward of Kiusembo.

From January to June the Doce River enters the sea; the landing is then made by entering the river and landing at the factories. During the remaining months the river is closed by a barrier of sand. Good landing can be effected on the barrier by using surfboats. Ships' boats should on no account attempt the landing.

Kiusembo.—There are no known dangers off this place, and the anchorage is good and nearer the shore than is usually the case along this coast. The landing is bad, but there are plenty of surfboats belonging to the factories, manned by Kroo and Kabinda men.

Supplies are rather precarious; but shellfish, fowls, and deer may be obtained; the prices are high.

Communication.—The steamers of Elder-Dempster Co. from Liverpool (monthly) call on their return voyage.

Factories.—The trading factories of Kiusembo, which are white-washed and conspicuous, stand on the summit of Kiusembo Point or bluff, at about 11 miles southward of the granite pillar.

Fish.—Off the coast about Kiusembo good fish are plentiful.

Kiusembo Point or bluff is a perpendicular whitish cliff. The cliff is only about 1 mile in extent, and is succeeded by a sandy coast as far as the Loze River, a distance of 5 miles.

Ambriz Bay, which is situated between Loge Point to the northward, and Ambriz Head, about 5 miles to the southward of it, is a slight indentation in the coast.

Loge Point, the northern boundary of this bay, is somewhat ill defined, being a low sandy point, skirted by a bank on which the sea always breaks.

Ambriz Head, which is a high, white, perpendicular cliff, forming the southern extremity of the bay. This cliff, when first seen from seaward, makes like three wooded hummocks, and as the land near the shore for some distance to the northward is low, the head, especially in misty weather, assumes the appearance of being isolated.

On the summit of Ambriz head are the factories, consisting of two British, two American, one French, and several Portuguese.

Light.—A fixed white light, elevated 52 feet above high water, visible 7 miles, is exhibited on an iron support at Ambriz, on the point at southern side of the port. Spray may cause this light to be visible about 2 miles only.

Loge River.—Into the head of the bay flows the Loge River; it is an unimportant stream, the position of which is marked by some unusually bright green lofty trees and a wooded hillock; the river is barred, and will scarcely admit small boats; but within the mouth there is a depth of 12 feet, and thence it is said to be navigable nearly to its source. There are numerous villages on the banks of the river.

Shoal.—A shoal tongue with $2\frac{1}{2}$ fathoms on its tip extends for 2,200 yards in a northerly direction from the northern side of Ambriz Head; it is about 500 yards broad.

Wreck.—The wreck of the Portuguese gunboat *Liberal*, with three masts showing above water, lay at a distance of 1.2 miles 335° from Ambriz Light, in August, 1910.

Pier.—At the northern side of the town and under the highest part of Ambriz Head, is a small pier, alongside of which small native craft sometimes lie.

Semaphore.—A semaphore has been established here. Vessels can communicate by the international code of signals.

Communication.—The steamers of Elder-Dempster Co. from Liverpool (monthly) call on their return voyage, and those of the Empresa Nacional Portuguese Co. from Lisbon, outward and homeward.

Supplies.—Water is scarce, but fresh provisions may be obtained from the interior by giving timely notice.

Fish do not frequent the bay, save in the morning at the entrance of the river, where, at that time, the seine may be used with advantage; but 12 miles offshore there are good fishing grounds.

Trade.—The exports consist chiefly of coffee.

Coffee (of which this is the principal place of export), together with ivory, skins, wax, gum copal, are the chief articles of commerce; a quantity of copper ore from the mountains of Bembe, some distance inland, is also readily transported to the sea by means of the Doce and Loge Rivers.

Climate.—Inshore of Ambriz Head there is much marshy ground extending several miles inland, which renders Ambriz Bay very unhealthy; the sea reaches it at spring tides, and the marsh abounds with fish. Sea birds also collect there in vast numbers. At night the coast is generally covered with a dense fog or mist arising from the marshy land, and which fills the lower strata of atmosphere, leaving the sky above perfectly clear. The dews are abundant, and the east wind is comparatively cold.

Directions.—When making Ambriz Bay from the northward, the Ararat Hills, the granite column, and Two-three Point, are admirable marks; but when approaching Loge Point care must be taken to keep an offing of at least 2 miles, in order to avoid the fringe reef around the point. The settlement may be steered for when bearing 114° .

When coming from the southward be careful to preserve an offing of 2 miles in approaching and rounding Ambriz Head in order to avoid the shoal water on its seaward side on which the sea frequently breaks in a depth of 5 fathoms and thence northward; this precaution, therefore, should be taken even by small vessels.

Anchorage.—The bay is an open roadstead, with a bottom of foul ground consisting of patches of rocks when within 2,200 yards of the northern part of Ambriz Head. The best anchorage is abreast the mouth of the river in 9 or 10 fathoms, mud, with Ambriz Head Light 114° ; and the Loge River 74° ; or vessels can anchor closer in, in 7 fathoms, at 600 or 800 yards to the northward of the buoy with the mouth of Loge River bearing 84° and Ambriz Head Light 142° .

Landing.—In order to land from the above anchorage make for the entrance of the river, but on no account attempt to cross the bar as it is treacherous and therefore to be avoided; when within 100

yards of the beach pull along shore southward, to the northern extremity of the cliff of Ambriz Head, which affords good shelter and comparatively easy landing.

It is necessary to follow the above instructions, because on the shoal off Ambriz Head, notwithstanding the depth of water, there is sometimes a sufficiently heavy swell to capsize or swamp a boat, and, during the continuance of rollers, the sea breaks along its whole extent. During heavy rollers no communication can be effected with the shore.

The coast—Little Mazula Bay.—From Ambriz Head to Dande Point, the distance is 38 miles nearly due 164° , and between these points are several remarkable hills 10 or 12 miles inland known as Mazula Hills. Little Mazula Bay lies $7\frac{1}{2}$ miles southward from Ambriz Head; a small stream of the same name falls into the head of the bay, which is barely 1 mile across between its rocky points. The village of Little Mazula lies abreast of the bay, off which there is anchorage in 7 or 8 fathoms. At the distance of 2 miles eastward of the bay is Mount Bamba, a hill with a rounded summit and sloping sides, which appears detached from the other elevations in the locality when bearing 74° . The shore presents an arid appearance, with an occasional clump of trees.

Mazula Bay, or Great Mazula Bay, lies about 16 miles south of Little Mazula Bay, the coast between being formed of steep white cliffs of uniform height, fringed nearly the whole distance with a reef extending 1 mile offshore and terminating to the southward at Onzo River, which falls into Mazula Bay. The mouth of the river is indicated by a deep fissure in the cliffs, which shelve down on either side, and the valley thus formed is filled with a mass of dark verdure. Above the cliffs of which the shore is composed is a line of hills irregular in outline running parallel and close to the shore; while about 10 or 11 miles in the interior the Mazula Hills, which are more peaked, form an excellent landmark. The village of Great Mazula (Mossul) is seen from seaward, as well as some factories.

Anchorage may be had in the bay in 8 or 9 fathoms water.

Lasina River.—From Mazula Bay, the coast preserves its bold character for a distance of 8 miles in a southeasterly direction to the mouth of the Lasina River, which is distinguishable by masses of lofty trees which line the shore for some distance and form a strong contrast with the red color of the land.

Dande Bay.—The northern point of Lasina River is also the northern extremity of Dande Bay, its southern boundary being Dande Point, which lies southwestward 8 miles from the former. The bay between these points falls back $2\frac{1}{2}$ miles eastward, and is divided into two unequal sandy indentations, by Bluff point, high

and rocky, 4 miles from Dande Point. This intermediate point appears perpendicular when seen from southwestward, while beyond the sandy beaches of the two bights rise a line of hillocks, with trees in the hollows. There is a village on the northern side of Bluff Point.

Dande Point, at the southern extremity of the bay, is the sloping base of a steep lofty cliff, which from a distance makes like a bold headland.

Dande River.—These cliffs continue eastward for a distance of 2 miles to the left bank of Dande River, the entrance to which is marked with trees. The river admits vessels of 100 tons, and is said to be navigable by vessels of moderate draft, some distance above the town of Dande, situated on the right bank of the river, about 20 miles from the entrance. The Central African Co. have established a trading station at Cachito, some distance up the river. There is a considerable trade between this river and Loanda.

Anchorage.—There is anchorage off the mouth of the river in from 6 to 8 fathoms water.

Cyclops Shoal is a sandy shoal, on which the British Naval vessel *Cyclops* (1849) grounded, $1\frac{3}{4}$ miles 40° from Dande Point.

Bengo Bay.—From Dande Point the coast trends to the southward for a distance of 8 miles to Spilimberta Point, the coast consisting of high red and white cliffs, thence the shore falls back southeastward and preserves its bold character 6 miles farther on, to the commencement of the sandy beach of Bengo Bay. From Spilimberta Point to Cape Lagosta, the southwestern point of Bengo Bay, the distance is $10\frac{1}{2}$ miles southwestward, and from this line the bay falls back to the southeastward a distance of 6 miles.

The head of Bengo Bay consists of a low beach, with hills a short distance inland, extending from the northward around the bay to Bengo Point, which lies about $2\frac{1}{2}$ miles southeastward from Cape Lagosta. In the bight of the bay, 6 miles from Bengo Point, the Bengo River falls into the sea, and the position of its mouth may be known by some trees on the beach, as well as by a high hill to the eastward. Near the beach, about midway between the river and Cape Lagosta, is the town and fort of Cacuaco, or Bengo, whence the markets of Loanda derive their supplies.

Anchorage.—The bay is clear of any known danger, and is much frequented by shipping, in order to avoid the anchorage dues at Loanda. The soundings diminish gradually toward the shore, but are deepest on the southern side. Anchorage may be had in 14 fathoms, with Cape Lagosta 209° , and Bengo Fort, 164° ; also in 16 fathoms within 1 mile of the cape; or farther in the bay in 7 fathoms with Bengo Fort bearing 164° .

This anchorage is useful to a sailing vessel proceeding to Loanda, if overtaken by night, or during a calm; and vessels are enabled to take advantage of the land breeze in the early morning, and thus facilitate their reaching the anchorage in the harbor of Loanda.

Cape Lagosta (Lobster Cape) is a perpendicular cliff, common to Bengo Bay and the port of Loanda, of a yellowish tint, crowned with trees; at its base are some black rocks above water, but the point is steep-to, and may be approached within 400 yards. It is distant 7 miles from Bengo River, and the land between is low at the head of the bay, but commences to rise 4 miles from the cape, in white and red cliffs, which form, on approaching from the northward, a remarkable contrast with the low land within it.

Light.—A fixed and flashing white light, elevated 210 feet and visible 17 miles, is exhibited from a lantern surmounting a white dwelling. Reported irregular. The lighthouse is partly hidden by trees.

Loanda Harbor.—This port lies westward of Cape Lagosta, and is formed between the mainland and Loanda Island and reef. The entrance is 2,400 yards across, and thence the space adapted for anchorage runs back 3 miles to the southwestward. From Cape Lagosta the coast trends about $1\frac{1}{2}$ miles southwestward to Fort San Pedro, which is low, and formed by a cutting in the solid cliff. Its walls are of a reddish color, and it has a double tier of guns.

Piers.—Coming from the anchorage, a small wooden staging lies on the left at the exit of the channel, alongside which whaleboats can go at any state of the tide. Heavier boats should go to the customhouse.

The pier of the railway workshops is completed. It is situated to eastward of Fort Penedo.

Another wharf, used for loading and unloading lighters, has been built between the railway terminus and the town quays.

Close to Fort San Pedro is a cenotaph, and from this position the shore trends to the southwest $4\frac{1}{2}$ miles as far as Fort San Miguel, at the northwestern extremity of the town of Loanda, and of which it may be considered the citadel. Eastward of Fort San Miguel $1\frac{1}{4}$ miles is Fort San Francisco de Penedo, erected on a rock at the water's edge, just eastward of which there is a pier. Between the above-mentioned forts stands the lower part of the town, while the higher portion occupies a commanding position on an elevated plateau within Fort San Miguel.

Beacon.—A beacon in the form of an obelisk is situated on the ridge to the southward of Fort San Pedro. It was almost hidden by trees in April, 1910, and consequently of little use, but in December, 1910, the grass and bushes around the beacon had been cleared, and it stood out clearly on the ridge.

The beacon is of use as a clearing mark for the reef in rounding it from the southward. If kept open well to the eastward of Fort San Pedro and bearing 156° , it clears the reef by 600 yards. In line with the center of the fort, bearing 148° , a line of soundings in over 14 fathoms was obtained along the edge of the reef in December, 1910.

Loanda Island.—The northwestern side of the harbor is formed by Loanda Island and Reef. The former is low and sandy, about 8 miles in length, northeasterly and southwesterly direction, with an average breadth of $\frac{1}{4}$ mile. Abreast of Fort San Miguel the island is only $\frac{1}{4}$ mile distant, and thence it extends $3\frac{1}{4}$ miles northeastward.

The island has a population of about 500 souls, principally fishermen, who supply the city with an abundance of good fish daily. On this island the Portuguese Government has established a marine depot for their navy. It is situated opposite Fort San Francisco de Penedo and among other buildings contains the residence of the admiral in command of the naval station. At the northeastern end of the island are three sheds forming the quarantine station, which are a good mark. The coal depot, with its deep-water jetty, lies between the marine depot and the quarantine station.

Light.—A fixed light, showing red northward and green southward, is exhibited on the landing stage at the Marine depot. It is useful in approaching the anchorage.

Loanda Reefs are a submerged prolongation for a distance of 1.3 miles of Loanda Island. They have $1\frac{1}{4}$ fathoms water on them, but the sea seldom breaks over them, and thus the utmost caution is necessary when approaching them on either side. The northern point of the reef is steep-to and lies 277° $1\frac{1}{4}$ miles from Cape Lagosta Lighthouse, and in the space between is the entrance to the harbor.

Lightbuoy.—A lightbuoy exhibiting a fixed white light has been moored on the northeastern edge of Loanda Reef on the site of the former lighthouse.

Isabella Rock uncovers 6 feet at low water, and is situated about 1 mile southward of the marine depot.

Light.—A fixed red light of low power, elevated 13 feet, and visible about 2 miles, is shown from an iron tripod erected on the rock.

Buoy.—A white cask buoy is moored in 4 feet of water about 200 yards northeastward from Isabella Rock Light.

Isabella Point is a low sandy point, 600 yards southwest of the above rock.

Light.—From a small house at the extremity of the point is exhibited a fixed green light.

NOTE.—The lights at Loanda are reported unreliable.

Directions—From the northward.—On approaching Loanda from the northward, the first land recognized will be the fine bold

cliff of Cape Lagosta with its lighthouse partly hidden by trees, and then the fort of San Miguel, with the upper portion of the town, the yellow hospital being most conspicuous. As Cape Lagosta is neared, the low land of Loanda Island, with its clumps of trees, and the lighthouse on the northeastern part of the reef, will be seen, and then keeping about midway between the reef lighthouse and the shore of Cape Lagosta, steer in for Fort San Miguel flagstaff on a 232° bearing, and anchor in from 12 to 14 fathoms.

As the sea breeze blows right out of the harbor, a sailing vessel has generally to work up to the anchorage, unless she has anchored overnight in Bengo Bay, when she would have the land wind in the early morning fair into port. But if compelled to work in, after having tacked off Cape Lagosta and standing over toward Loanda Reef, tack before Fort St. Miguel comes within its breadth of the southeastern end of Loanda Island, as the reef is steep-to, with 17 and 18 fathoms close alongside it. Then standing toward the mainland, tack before the cathedral on the hill within Fort St. Miguel touches the sandy point of the public gardens, as the bank is steep-to, and the water will shoal while the vessel is in stays from the depth of 12 to 5 fathoms; on the other side the island shore is bold-to, and may be approached accordingly.

Sailing vessels working from the Kongo River to Loanda should anchor every night, when the sea breeze falls light, so that they may weigh with the first of the land breeze, and continue on the port tack, until about 1 p. m., when they should tack, and by the time the sea breeze fails good progress will have been made to the southward.

From the southward.—When approaching from the southward, Fort San Miguel may be seen in clear weather from a distance of 16 or 18 miles, assuming an appearance of being white and standing on a high promontory. The island of Loanda will not be recognized until much nearer inshore, and from the masthead the water of the harbor will be seen within it. As Cape Lagosta, Fort San Miguel, and the beacon southward of Fort San Pedro are admirably adapted for fixing the position of a vessel by cross-bearings outside Loanda Reef, no difficulty will be experienced; give the northern end of the reef (which is extending) a good berth in passing by bearings of Fort San Pedro, bring the flagstaff of Fort San Miguel (well open of the extremity of Loanda Island) to bear 232° , and steer into the anchorage on that bearing, and bring to in from 12 to 14 fathoms. (See Beacon, page 391.)

Anchorage.—Vessels of large size lie here in smooth water at all seasons, and the anchorage is good.

When a high southwest wind prevails the waves dash over part of Loanda Island and drive large quantities of sand into the harbor, which is gradually filling up. Great quantities of soil are also washed

down from the heights during the rainy season, so that the part which once contained water sufficient to float the largest ships close to the customhouse is now dry at low water.

Dredged channel.—The channel leading from the anchorage to the town has been deepened to a depth of 6 feet at low water; the maintenance of the depth depends upon the amount of work done by a local dredger. It is marked by cylindrical buoys, four red on starboard hand entering, four black on port. The stream during ebb, at its strength, runs $1\frac{1}{2}$ knots an hour in the channel.

In 1905 the dredged channel was reported to have silted up considerably, and nearly all the buoys marking this channel to be missing. Depths not exceeding 4 feet extended right across the harbor in a northwesterly direction from the white buoy marking Isabella Rock.

Lightbuoys.—The channel leading from the anchorage to the town is dredged to a depth of $6\frac{1}{2}$ feet at low water (1912).

At night the red buoys show red lights and the black buoys show green lights.

Dredging is in progress (December, 1911) between Isabella Rock and Isabella Point.

The town of Loanda is not only the capital of Angola, but is also the principal city of the Portuguese dominions in West Africa. It stands at the head of the bay or port of the same name, derived from Loanda Island, which shelters it from the west, and is conspicuous from seaward. The city was erected by the Portuguese in 1578, is a bishop's see, and is divided into a lower and higher town; it is of considerable extent and contains numerous buildings, including the observatory, cathedral, and several churches.

The lower town skirts the shore between Fort San Miguel and Isabella Point, and is occupied by the mercantile community. The town hall, with slate roof and red dome, about 1 mile eastward of Fort San Miguel, is conspicuous. At the back is the native town, which is built of huts. The upper town is naturally the most healthful part and contains the principal residences, including those of the Portuguese governor, bishop, and consuls, and the hospital. The last-named building is painted yellow with a remarkably wide open road leading to it. It is most conspicuous from the northward. Near Fort San Miguel is the observatory, with a square white tower.

There is a convict prison here.

The city is fortified, but the forts are now used as prisons and workshops. In addition to Fort San Pedro, which was erected between the years 1703–5, there is the handsome fortress of San Francisco de Penedo. The fort of San Miguel stands on an elevation to the westward of the upper part of the city and is conspicuous from seaward. San Miguel, erected in 1641, is celebrated as being the

place where, on the 15th of August, 1648, seven years after they had taken the city, the Dutch capitulated and, surrendering the fort to the Portuguese, vacated Loanda.

The population of the town and suburbs, though necessarily fluctuating in numbers, consists of about 17,541, of which about 3,000 are Europeans.

The currency is principally paper. The money in use consists of copper pieces of from 5 to 60 reis and silver coins of 100, 200, and 300 reis; gold coins are very scarce.

Exports.—The principal articles of export are coffee, rubber, and wax; also cotton fibers, archilla, palm oil, and palm kernels.

Imports consist chiefly of cotton goods, wines in cask, flour and other provisions, coal, gunpowder, etc.

Supplies.—The market is moderately supplied with live stock, vegetables, fruit, and fish. Provisions, marine stores, and other necessities for ships may be obtained. Fish can be caught in large quantities with the seine.

A plentiful supply of good water is conveyed to the town from the Bengo River and is brought alongside vessels requiring it by a water-tank holding about 35 tons, which is filled from a hydrant on the contractor's wharf.

Coal.—There is a coal depot on Loanda Island, and also a coal hulk in the anchorage. About 8,000 to 9,000 tons of coal are imported annually, 1,500 to 2,500 tons being usually kept in stock. There are 20 coal lighters of from 20 to 70 tons capacity, and the coal is brought off in bags at the rate of about 200 to 250 tons a day. Labor is scarce.

A pier belonging to the Portuguese Government is located on Loanda Island, from which vessels of heavy draft can coal. It is equipped with steam cranes.

Docks.—There is a floating dock at Loanda, 196 feet over all, capable of lifting 1,300 tons, of 15 feet draft. There is a small dry dock for vessels of 150 feet in length and 3 feet draft. There is a slip for lighters of 60 tons at the coal depot.

Repairs.—The Government has large workshops in the city, and repairs of machinery, boilers, and ironwork generally can be effected. Weights of 10 tons can be handled.

Telegraphs.—Communication by submarine cable is open between this port and Europe via Cadiz and via St. Vincent, the latter being the more reliable route; also with the Cape of Good Hope. Angola has its own internal system, with lines to Dondo and Kasongo, a distance of about 200 miles; also to Ambriz, Kiusembo, Mussera, Ambrizette, and San Antonio at the mouth of the Kongo.

Railways.—The Royal Trans-African Railway from Loanda to Ambaka, a distance of 220 miles, has been constructed, and in 1899

was open to the right bank of the Lukalla River, 5 miles beyond, and prolonged to Malange, another 87 miles, in August, 1909.

Communication.—The vessels of Elder-Dempster Co. from Liverpool, and those of the German Woermann Co. from Hamburg, call every month, and those of the Portuguese Empreza Nacional Co. three times a month.

Tides.—It is high water, full and change, in Loanda Harbor at 3 h. 48 m.; springs rise $4\frac{1}{2}$ feet.

Time signal.—The time ball is dropped at Greenwich mean noon. It is hoisted halfway up 5 minutes before, and close up 2 minutes before being dropped.

The official time kept in Angola is 1 h. 0 m. 0 s. fast on Greenwich mean time.

A semaphore station has been established at Fort San Miguel and vessels can communicate by the international code of signals.

Mooring buoy.—There is a large mooring buoy off the arsenal for Portuguese naval vessels.

Quarantine.—Vessels entering with a foul bill of health, or with any contagious sickness on board, must carry a yellow flag at the fore. The diseases quarantined are yellow fever, cholera, typhoid fever, smallpox, and measles. Health certificates must bear the signature of the Portuguese consul of the port at which they are obtained, or a ship will be placed in quarantine.

Health.—Intermittent fevers are prevalent all the year around—the months of February, March, and April are the worst. The native population is subject to periodical epidemics of smallpox of a virulent kind, from October to April.

Hospitals.—A commodious hospital belonging to the Portuguese Government is situated in the southern part of the city of Loanda. It is open to the seamen of all nations on payment of the usual fees.

Carimba Lagoon.—The low sandy spit of which Loanda Island is the northeastern extremity extends in a general southwesterly direction for a distance of 25 miles to Palmeirinhas Point, and incloses along its whole length an extensive but shallow lagoon, which communicates with the sea through an opening in the spit 2 miles wide, named the bar of Carimba, 5 miles southwest of Fort San Miguel. It is defended by Fort San Ferna Fernao on the northeastern side, and was formerly an entrance into the harbor of Loanda, leading round the fort of San Miguel, where at present there is scarcely sufficient water to float a canoe.

The southwest part of this sandy spit is known as Careange Island, and extends from the bar of Carimba to Palmeirinhas Point, where it joins the mainland, on which 2 or 3 miles northward may be seen from seaward, over the spit and lagoon, the town of Tanza.

Palmeirinhas Point, the southwesterly extremity of the above-mentioned sandy spit, is low and sandy, with clumps of palm trees, and hence the name. Cape Lombo is the name given to the northern part of Palmeirinhas Point.

Light.—A flashing white light, elevated 66 feet and visible 13 miles, is exhibited from an iron trellis-work lighthouse, 52 feet high, painted in alternate black and white bands, erected 330 yards within Palmeirinhas Point; the period of the light is probably irregular. The keeper's dwelling near the light is white.

Angola—Climate.—The climate of Angola is very changeable, generally hot and damp, particularly along the coast, or near the rivers that run through the province. In the interior it is much cooler and more healthful, especially in Pungo, Andongo, Malange, Kasongo, Caconda, Bihe, etc. Mossamedes, which is on the coast, is generally considered healthful, but in exceptionally wet seasons, as in 1899, the whole of this coast is unhealthful. There are two seasons, winter and summer, or the healthful and sickly seasons. The former, from May to September, is also termed the Caçimbo or cold season, when there is generally cloudy weather or fogs in the morning. From 10 a. m. until sunset the atmosphere is usually clear, with cool, refreshing breezes, and the thermometer ranges between 73° and 66°. This is the harvest season when the rains have fallen at the ordinary time. In 1887 the temperature was several times as low as 55° F., although, for the year, it generally averages about 74°. The sickly season is from October to June, when it is much hotter, the maximum temperature ranging from 90° to 120°. The most unhealthful months are March and April, as a rule. For newcomers it is safer to arrive about May, when, after passing through the cold season, they gradually get used to the hot weather. The heavy rains on this coast generally commence about March, and the rain continues as long as southeast winds predominate; they are generally fresh, and bring with them squalls offshore. In Loanda little rain prevails, and sometimes years pass with none to speak of. The annual average is 11 inches. Six months out of 12 (May to October, there is little beyond a few showers.

Diseases.—The most serious and prevalent diseases are dysentery, fever, ague, and those of an inflammatory nature. Smallpox every now and again creates great havoc among the natives, although it rarely attacks Europeans. It has been remarked that people whose duties compel their being constantly afloat are those who are most frequently attacked.

Winds.—The winds and weather off the coast between Mouta Secca Point and Palmeirinhas Point are thus described: In May the southeast winds prevail, and follow the line of coast; they are perhaps the regular trade winds, which during this period of the

year generally obtain the mastery over the usual southwest wind, and are probably analogous to the harmattan, north of the Line. After this comes the cool season, which continues until September, and during this time the winds are usually light from southwest during the day and southerly and southeasterly at night, with a considerable amount of calm.

During the calm weather the atmosphere is generally thick or smoky, but, though it lessens the boundary of vision, is neither disagreeable nor unhealthful. These being the winter months in the South Atlantic, the swell and surf are much heavier than during the other portion of the year. The age of the moon has much influence on the swell, which is perhaps greatest at the full and change during the month of August.

About the middle of September the weather changes, and a steady breeze sets in from the southwestward, lasting night and day, and may be depended on until the beginning of December, when it becomes fitful and unsteady, with occasional calms; though 20 miles from the coast, the southwest wind continues to prevail.

From November to February, inclusive, the breezes are fresh from southwest to south, but occasionally veering round to southwest by west and even west by north, thus facilitating navigation along the coast. The sea breeze sets in between 10 and 11 a. m., and falls during the night; it is replaced toward midnight by a light land breeze which varies from southeast by south to east by south, and continues until 8 or 9 a. m. However, the land and sea breezes on this coast are not very regular, and are therefore not to be depended on. In November and December slight showers fall during the morning when the wind is southerly, but on its hauling round to the southwestward the weather improves and sky clears. In the months of June, July, and August thick fogs commence at night and last until the forenoon of the following day.

Sometimes there are appearances to the eastward of a coming storm, attended with lightning, but they seldom bring any wind to the coast; on the contrary, the wind generally falls and terminates in a calm. At night these appearances are seldom witnessed after 10 or 11 o'clock, and after their dissipation the light land breeze continues through the night. These storms, however, must be felt in the interior, and cause great rain to fall, for the rivers commence to rise at the end of October, and continue to throw out vast quantities of water until February.

Coast currents.—The general set of the current southward of the Kongo River is alongshore to the northward at the rate of 1 mile an hour; but it is very irregular, both in direction and velocity, for sometimes, between October and May, but principally in March,

April, and May, the direction of the current is completely reversed, and is found setting southward, and sometimes southeastward. This occurs generally after the rains and northerly winds, but can only be regarded as of an exceptional character; this abnormal current continues for two or three days, but seldom exceeds a week's duration. During calms especially the currents are very irregular, and not to be depended on, as sometimes they run contrary to their usual direction, and in the month of July have been known to set to the southwest.

About Loanda and Palmeirinhas Point the current has been known to set 15 or 20 miles a day to the eastward, or directly on the shore; and although this indraft is not constant, it is by no means infrequent.

The British naval vessel *Philomel*, when about 10 miles to the southward of Loanda, was drifted toward the coast in the month of October, 1854, the current setting her to the southward about 30 miles between noon of the 19th and the midnight following. The current on this coast usually sets to the northward, and a southerly set is most unusual, particularly with such velocity. In running from the southward toward the Kongo River during the night vessels constantly overshoot their distance and find themselves in the Kongo Stream.

Rollers.—The rollers along the coast of Angola, though very troublesome in open bays, are not dangerous to vessels riding with a long scope of chain; but in order to avoid the disagreeable rolling which invariably ensues it is better, if possible, to stand out into the offing as soon as they commence. This phenomenon generally takes place about the time of full and change, and the rollers are always greater when they set in soon after the event; but usually they occur two or three days after full and change, and are more or less violent. It is difficult to assign any particular period for the rollers, as they are experienced throughout the year, but they happen more frequently from April to September.

Tides.—Along the coast of Angola the rise of tide at springs is from 5 to 6 feet. The stream at the ebb is little felt, as it is overcome by the general current; but in bays, however, it is perceptible on ships during a calm or with very light winds.

Coanza Bay.—From the southern part of the round of Palmeirinhas Point to Malli Point at the mouth of Coanza River the distance is about 16 miles southeastward; the intervening land is low. Immediately within Palmeirinhas Point is an indentation, the southern boundary of which is 6 miles distant from the point; this bight is known as Coanza Bay and may be recognized by a high, dark wood in its center near the sandy beach, while in its northern part are two hills (not charted) known as the Paps. There is anchorage in

this bay in from 6 to 9 fathoms, oozy bottom. Farther to the southward is another slight indentation, which also affords anchorage in 8 or 9 fathoms.

Coanza River.—This river is a stream of considerable magnitude, and its clayey waters discolor the sea for a distance of 10 to 15 miles seaward. The Portuguese have several settlements on its banks, and its inner navigation, extending far into the interior, is said to be important. From Malli Point, on its northern side, which is densely wooded, the mouth of the river is about 1 mile across, but the bar is ever shifting and frequently breaks throughout its whole extent; it is extremely dangerous for boats, which should never attempt to cross.

Small vessels, however, drawing 8 or 9 feet water, with a smooth sea and local knowledge cross the bar at high water; these can proceed many miles up the river, which trends northeastward for about 22 miles, thence generally eastward and southeastward for a considerable distance.

The Coanza is navigable to about 180 miles from the coast (following the course of the river) in the wet season, for vessels drawing about $4\frac{1}{2}$ feet water; in the dry season not infrequently not more than 18 inches of water is to be found in the channels in some places.

Two miles within the entrance on the northern bank, Lake Kirinje pours its water into the river by a stream of considerable magnitude; and 1 mile beyond, on the southern bank, is the settlement of Kassanha. Kalumbo (connected by telegraph with Loanda), on the northern bank, one of the earliest Portuguese settlements, is about 34 miles from the entrance, and Muxima, on the south bank, 75 miles. Beyond Muxima, a distance of 27 miles, and 1 mile east of the confluence of the Lukalla River with the Coanza, is Massangano, a minor military position, but the climate is unhealthful.

The settlements of Dondo and Cambambe on the northern bank, about 16 miles farther on, mark the limit of navigation, for a little beyond are some large cataracts and rapids; the climate is healthful and the soil moderately productive. The Central Africa Co. have four trading stations on the river. The railway from Loanda to Ambaka approaches the Coanza about 12 miles above Kalumbo.

There is a line of small steamers running between Loanda and the Coanza.

The next settlement is Pedras de Pungo Andongo, or Pedras Negras, 5 miles from the northern bank of the Coanza River, 60 miles northeastward of Cambambe, and 228 miles or eight days' journey from Loanda. This place was the ancient capital of the kings of Dondon, and was taken by the Portuguese in 1671; it stands in a superb situation, in the midst of a country of wonderful beauty and fertility, and occupies the summit of a sandstone rock which is

inaccessible except by a cavern through it to the fort. The last settlement on the river, 360 miles from the sea, was founded in 1838 and named Duque de Braganza; it is stated to be healthful and fertile.

Anchorage.—There is anchorage off the mouth of Coanga River in from 15 to 12 fathoms, 9 miles offshore, as well as in 9 fathoms 3 miles off. There is also said to be good anchorage in 6 fathoms, mud, about 2 miles from the shore.

Soundings.—Between Dande Point and Spilimberta Point the coast is generally steep-to, with a mean depth of about 11 fathoms at the distance of $1\frac{1}{2}$ to 2 miles offshore; but the depths are much greater between Cape Lagosta and Palmeirinhas Point, where the depths close to the edge of Loanda Island, and the long sandy bank westward of Carimba Lagoon, vary from 25 to 33 fathoms. Between Palmeirinhas Point and Coanza River the water is not so deep, and depths of 10 to 15 fathoms will be found at a distance of about 7 miles from the coast.

The 60-fathom line is distant 10 miles from Loanda Island, and the depth exceeds 25 fathoms until within about 1 mile from its coast. Off Palmeirinhas Point the depths are 40 fathoms at the distance of 11 miles, and 15 fathoms at 6 miles, but on the parallel of Coanza River the bank extends much further off, and 80 fathoms will be found at the distance of 30 miles from the coast, decreasing gradually toward the shore. This part, however, is but imperfectly sounded out.

Coast of Benguela.—The province of Benguela, the largest in Angola, extends from Coanza River to Cape Negro and includes a coastline of about 450 miles.

The coast.—From Coanza River to Cape Ledo, the distance is 25 miles to the southward, the intervening land being moderately high, with red cliffs facing the sea, the soundings being regular and from 7 to 9 fathoms at the distance of 6 miles offshore, the coast between being safe and without any known danger.

Cape Ledo is a high, black, rugged promontory, covered with trees apparently withered, and the land to the northward as far as Black Point, a distance of 11 miles, consists of steep hills and verdant land. The cape when seen bearing 186° appears like a lion with the two forepaws in front, the trees and long grass forming the mane.

Cape Ledo is easily recognized from seaward, as it is a salient point, presenting the appearance of a truncated cone and is nearly $1\frac{1}{2}$ miles long from north to south. A reef projects a short distance from the northern end of the cape, but there is a depth of 11 fathoms at the distance of about 1,600 yards from it.

Mastote Bay.—The bight between Black Point and Cape Ledo is known as Mastote Bay, and within the cape is a small sandy cove, into the head of which falls the Suto River.

There are no supplies to be obtained here. A few miles inland are partridges and guinea-fowls, also antelopes and leopards. The natives are a low, wild-looking people, almost naked and very dirty.

Suto River is sometimes dry, though it seems to have a good flow in the wet season. The mouth is choked with sand; just inside is a salt-water pool teeming with small fish, which may easily be taken with a seine.

Anchorage.—The bay affords good shelter from southwest winds, though at times a heavy swell sets round Cape Ledo, causing a ship to roll and creating a heavy surf on the beach. Occasionally there is no surf, and ships' boats with a good coxswain can nearly always land. Anchorage may be taken in $4\frac{1}{2}$ fathoms water with Cape Ledo bearing 246° and a conspicuous tree on the hill 191° . The water shoals gradually toward the beach, and the bay is apparently free of dangers.

The coast between Cape Ledo and Cape St. Bras, 16 miles southward, forms a slender bight bordered by remarkable white cliffs; the soundings are regular, with a depth of 10 fathoms, 2 or 3 miles offshore. On the northern side of Cape St. Bras is a sandy cove, where there is anchorage in from 8 to 4 fathoms, while about 5 miles northeastward of the cape is the mouth of the small Kisama River or Kesimi.

Cape St. Bras is steep-to, with a depth of $4\frac{1}{2}$ fathoms within 100 yards; it offers a moderate lee, but landing in ships' boats is difficult, and at times impracticable. The before-mentioned depth continues round the cove to a sandy spit about $\frac{1}{4}$ mile long; inside the spit there is a small salt-water lake, in which fish are plentiful, including sharks and sawfish. In 1907 there were no inhabitants.

Longo Point and River.—This point, which offers no lee for anchoring, lies 18 miles 152° of Cape St. Bras, and is a bluff headland, covered with brushwood; there is high tableland between, and in a bight southward of Longo Point is an indentation, into which falls Longo River. In this locality there are no inhabitants; but lions, tigers, deer, and other wild animals exist in great numbers.

Along this portion of the coast there is a depth of about 10 fathoms 1,400 or 1,600 yards from the shore.

Cape Three Points.—From Longo Point 156° about 10 miles is another projecting headland, known as Cape Three Points, the intervening land being composed of high, white, and irregular-shaped cliffs, excepting in the immediate vicinity of Longo River, which lies at the head of the bay between the above points, the entrance to

which is well wooded. Across the bay the depths are from 10 to 12 fathoms, muddy bottom in general, about 5 miles from the land.

The coast.—Between Cape Three Points and Morro Point, 23 miles southward, the coast forms a bight, within which there is a depth of 10 fathoms, within 2 miles of the shore. Within Morro Point the coast trends eastward for 5 miles, and thence northward to Cape Three Points, the shore throughout being without any known danger. Northeastward of Morro Point are several hills, known as the hummocks of Old Benguela.

Morro Point, or Old Benguela Head, lies 158° 23 miles from Cape Three Points, and is one of the most remarkable headlands on this part of the coast. It is very high, bold, and perpendicular toward the sea, and appears on some bearings as a double point, occasioned by another bluff within it. The summit of Morro Point, as well as the bluff alluded to, is covered with tall straight cactus trees, which have a peculiar appearance. There is also a large village on Morro Point, and some factories are established in the bay to the northward, but it is now an insignificant place.

Anchorage.—There is good anchorage to the northeastward, and under the shelter of Morro Point, where the water shoals gradually from 15 and 14 fathoms, at 1 mile from the land, to about 4 or 3 fathoms within 200 yards of the beach. Here the water is tolerably smooth, but neither provisions nor water are to be obtained.

Cubo River.—At the distance of 10 miles southeastward of Morro Point is Cubo River; the position of the river's mouth may be known by the usual clumps of dark mangroves. About 3 miles southward of the Cubo is Moroa River, and 6 miles farther on is the village of Kingo, where several large factories are established. Landing is very difficult along this part of the coast.

Aspect.—The bold nature of the coast disappears in the vicinity of the Cubo and Moroa Rivers, the waters of which flow through a low wooded plain; but southward of the latter river the cliffs reappear and continue almost without interruption as far as Lobito Bay. In these cliffs there will be observed yellow spots, occasioned by landslips. During clear weather, and particularly in December, January, and February, the summits of some high mountains are to be seen in the interior, apparently running parallel to the shore.

Nova Redonda.—At the distance of 23 miles 155° from Morro Point is the town of Nova Redonda, the coast between forming a small bight. The town is of moderate elevation, occupying the most easterly position on the coast between Capes Lopez and Negro, and is easily recognized by a white fort and several white houses, which show out well and may be seen at a considerable distance from seaward.

Light.—A fixed white light is shown from the northern angle of the fort, at an elevation of 103 feet above the sea, and is visible 13 miles.

Anchorage.—The best anchorage is in from 4 to 7 fathoms, with the fort bearing 95° .

The town is considered to be the third in size and importance of the Portuguese possessions on this coast, but the fort is in a state of great dilapidation. Stock of all kinds may be procured, but no water. There are about 50 white people in Nova Redonda; these are employed in cultivating the sugar cane and rearing sheep and pigs.

Landing is very difficult except in surf boats, a number of which are always in readiness on the beach.

Signals.—A wide road passes near Fort Nova Redonda, and descends to the sea; on this road, at the top of the hill, there is a dwelling, the owner of which replies to signals made by the international code.

Communication.—The Empreza Nacional Co.'s steamers from Lisbon call twice a month.

Trade.—The export trade consists chiefly of rubber, palm oil, kernels, and wax.

The climate of Nova Redonda is considered to be very unhealthy during the rainy season.

Reported Bank—Caution.—There is said to be a bank 3 miles westward of Nova Redonda, on which a brig is reported to have struck; vessels should avoid the assumed position of it.

Gunza River, after flowing through a rich and thickly populated country, falls into the sea 3 miles southward of Nova Redonda. For five or six months in the year the river is absorbed by the porous sandy ground. The inhabitants, by means of steam pumps, irrigate the soil with most beneficial results.

Kikombo.—From Nova Redonda the coast runs in a southerly direction for a distance of 12 miles to Kikombo, situated at the head of a bay of the same name.

Kikombo may be known from northward and westward by a remarkable zigzag road which lies at the back of the town and leads over the mountains in the interior; this is the best and most conspicuous distant mark of recognition from the offing. There are several Portuguese factories here.

Kikombo Point, the southern extremity of the bay, is a bluff red point, off which a rocky shoal of 2 fathoms, on which the sea frequently breaks, extends about 1,400 yards in a northerly direction.

Red Point, 2 miles southward of Kikombo Point, may be recognized by the red spots which mark its southwestern face.

Supplies.—Kikombo is a place of considerable commercial importance, and is an excellent place for stock of all descriptions,

including bullocks of a superior kind, which are obtainable at a moderate rate. It is also important as a watering place, there being no other where water is easily procured between it and Little Fish Bay. The watering place is a large sheet of water at the mouth of the Kikombo River, close over the beach near the village, and here casks may be filled and parbuckled into a boat. There is much fish in the bay.

Directions.—There is good anchorage in Kikombo Bay, excepting during the time of the rollers which frequently occur a couple of days after full and change, when they set in so heavy as to prevent communication with the shore; and therefore it is not advisable to anchor closer to the beach than $1\frac{1}{2}$ miles, if intending to remain over that time. To enter the bay from the northward the village should be brought to bear 163° or 174° when anchorage may be selected at any convenient distance.

Anchorage.—A good position is in about 5 fathoms, sand and mud, with the village bearing 163° and Red Point (about 2 miles southwestward of Kikombo Point) just open of an intermediate point 203° . There is a good inner anchorage in about $4\frac{1}{2}$ fathoms with the village 181° and Kikombo Point 213° , but the anchorage inside the bay is not safe when rollers set in. Coming from the southward give Kikombo Point a berth of 1 mile on its northwestern side and select a convenient anchorage.

Kisingo.—The land to the southward of Kikombo is high. The village of Kisingo Pequeno, about 8 miles southward of Kikombo, is a mere cluster of native huts.

Landing can only be attempted in surfboats, but about 1 mile northward of Whales Head, boats can land when the water is smooth, though as there is no village, supplies are not obtainable.

Whales Head (Nova Redonda of Owen) is a dark-colored point, projecting about 1 mile into the sea from the general line of coast, and may be identified by a remarkable piece of table-land near the beach, about 2 miles northward.

Pigeon Bay—Southward of Whales Head is a slight indentation 5 miles in length, presenting a fine sandy beach throughout, and terminating southward in a rocky point. The sea breaks with considerable violence on the shore; nevertheless vessels occasionally anchor in the bay and trade with the natives of Kisingo Grande, which lies about 1 mile southward of Pigeon Bay.

Tapado River.—At the distance of 9 miles southward of Pigeon Bay is Tapado River, which may be identified by some vegetation in the middle of a somewhat steep ravine. Here also is a village, and there is anchorage in 8 fathoms, about 1 mile from the shore with the village bearing 95° .

The coast.—From Whales Head the coast trends southward 23 miles to Logito River, the shore throughout from Kikombo being formed of high, perpendicular, chalky cliffs, which are seen from a great distance seaward with the afternoon sun. Along the whole ledge of this portion of the coast a vessel may run within 1 mile of the cliffs without danger.

Logito River, or Egito River, may be known by a large white house standing on the right of a deep gorge, half-way up the cliff, as well as by a remarkable cliff a little southward of the entrance of the river, in form of a quoin, declining toward the mouth. There are a few houses close to the beach at the foot of the valley and there is good anchorage in about $6\frac{1}{2}$ fathoms, $1\frac{1}{2}$ miles offshore, with the house on the hillside bearing 117° .

Supplies.—The mouth of the river is an excellent watering place, as the water coming from the mountains is perfectly wholesome, and better in quality than at any other place on the coast; but a smooth sea is absolutely necessary. As there is generally a heavy surf, especially at the full and change of the moon, the most expeditious plan is to haul the casks off to a boat anchored outside the surf, and then raft them off to the ship. There are several Portuguese factories here, and bullocks and stock may be obtained, but no vegetables.

Anchorage on coast.—Vessels may bring up if necessary with the stream anchor in 30 fathoms, 10 miles from the land between Logito and Kikombo, but farther to the northward the water is deeper at that distance. In working along the land during the night, soundings should be obtained with the hand lead before approaching too close. In some places between Whales Head and Kikombo, depths of 7 fathoms have been found at a distance of 4 or 5 miles offshore.

Oyster Bay—Landing.—At the distance of 4 miles southward of Logito River is a large village with two factories, fronted by a sandy beach, which falls back into a bay 4 miles across between its points. In this bay the boats of coasting vessels are enabled to land, notwithstanding that the sea breaks on the beach with considerable force.

Anha.—The village of Anha stands at the mouth of the river of the same name, 15 miles southwestward from Logito River, and from the offing presents a most picturesque appearance, being situated in the midst of luxuriant vegetation. There are several Portuguese residents here, traders in orchilla.

The anchorage is in 7 fathoms, with the river 128° , 2 miles distant, but in consequence of the heavy surf which invariably breaks on the beach it is impossible to land in ships' boats, even under the most favorable circumstances.

Lobito Bay.—This excellent and secure harbor, the best on this part of the coast, appears to have been unknown, excepting to the

slave traders, until it was discovered by the British naval vessel *Waterwitch* in 1840.

Lights.—An alternating group flashing light, visible 18 miles, exhibited 351 feet above the sea from a cylindrical tower painted red and white in horizontal bands on the eastern side of the entrance.

A fixed red light, visible 2 miles, exhibited 33 feet above the sea from an iron tripod near the end of the spit at Lobito Point.

Two black light buoys, each showing a fixed green light, are moored 2.6 miles 60° and 1.4 miles 74° from the Government House.

A fixed red light is exhibited on the end of the pier and lights are occasionally shown from the hospital.

For details see Light List.

The bay.—The entrance of the bay is 1,400 yards across, and thence runs back with a slight increase of width about 2½ miles in a southwesterly direction. The beach on the northern side of the bay, within Lobito Point, is steep, there being in most places 10 fathoms within 200 yards of low-water mark, and from 14 to 20 fathoms in the middle of the bay. Government House is situated in the southwestern corner of the bay, and the hospital on Lobito Point 1 mile from the lighthouse, and there is a flagstaff in the southern corner of the bay. The head of the harbor is occupied by an extensive bank, which dries at low water, when the smell is very offensive.

Fishermen reside in the southwestern corner of the bay and on Lobito Spit to avoid the wind from the swamps and have the benefit of the sea breezes.

As sharks are very numerous, care is necessary when bathing.

Mooring buoys.—There are four mooring buoys in the harbor; they are only intended to assist vessels in going alongside the pier.

Pier.—A pier, alongside which two vessels of 30 feet draft can lie at one time has been constructed. There are two steam and one hand crane on the pier, also two lines of rails.

The town of Lobito has largely developed in recent years, owing to the numerous personnel employed on the railway construction.

Railway—Lobito is the terminus of the railway which, after passing through Catumbela and Benguela, strikes inland, and is intended eventually to serve the Katanga Mines, crossing the Angola and Belgian Kongo frontier close to Kangombi. In September, 1912, the length of line open to traffic was 268 miles, to Huambo. From Huambo to Kangombi the distance along the proposed route is 534 miles.

Coal.—The railway company possesses a stock of coal, and can generally supply about 50 tons to a vessel demanding it.

Landing place.—Boats go alongside a ladder at the southwestern angle of the wharf.

Supplies.—Beef and vegetables are to be had daily by train. Poultry may be obtained, and oysters are found in great abundance on both sides of the river which falls into the head of the bay; lime, from the shells of the oysters, is exported in considerable quantities to Benguela and Loanda. Firewood, and sometimes a supply of lime, can be procured on obtaining permission from the Governor of Benguela. Fish are abundant and may be taken with the seine. Vessels lying alongside the pier can take in fresh water from pipes at its extremity.

Communication.—The homeward bound vessels of the Union Castle Line call every 8 weeks.

Tides.—It is high water, full and change, in Lobito Bay, at 3 h. 38 m.; rise at springs $5\frac{1}{2}$ feet.

Directions.—The harbor is not easily made out by a stranger, but the new lighthouse serves as an excellent mark, otherwise a vessel might pass within 3 or 4 miles without perceiving the water of the bay over the long, low sand-spit terminating in Lobito Point, for from a distance the spit resembles a beach on the mainland. A conspicuous white patch (an embankment for a new road) opposite the spit, is a good mark both from the northward and southward. A row of three white marks joined together, resembling the arches of a bridge, on the hills close eastward of the entrance, may assist in recognizing the locality, also the fact that northward of Lobito the coast has sloping beaches, while southward the low plain falls steeply to the sea, but the latitude and a bearing of St. Philips Bonnet (20 miles to the southwestward) is a good guide.

When coming from the southwestward, the fort at Catumbela, a large white building on the hill, will be of assistance in finding Lobito Bay, as well as a conspicuous niche in the land just to the northward. Lobito Point should be given a good berth, as it is reported to be extending, after which course may be altered as required for the anchorage. It will be necessary for sailing vessels to work in, and in doing so care must be taken not to stand into less than 8 fathoms toward the eastern shore, as the water within this depth shoals suddenly.

Anchorage.—Ships should not anchor nearer than $\frac{1}{2}$ mile from the head of the bay, not only because the water becomes shoal, but on account of the unhealthful nature of the locality.

The coast between Lobito Bay and Benguela forms a bay which is low and wooded. From the head of the bay the cliffs recede several miles into the interior, and thence, taking a southwesterly trend, circumscribe the great plain at Benguela and rejoin the sea at St. Philips Bonnet.

Catumbela River falls into the sea, at the distance of 6 miles southwestward from Lobito Point. The position of the river is

rendered conspicuous when bearing 94° by a remarkable opening in the hills 4 miles inland, through which the river passes. Just westward of the opening is the town, connected by railway with Lobito Bay and Benguela. Two forts, of a reddish white color, at the entrance, also serve to point out its position. The river is said to attain considerable dimensions some miles inland and to traverse 180 miles from its source in the southern part of the mountains of Caconda.

In the rainy season the river overflows its bed and inundates a great extent of country, but in the dry season it subsides into a large stream. The river is accessible to boats, and water is easily procured; but it is said to contain injurious vegetable matter, which frequently produces dysentery. A large population exists in the immediate neighborhood of the river and many houses are visible on the shore near the right bank of the river, whence stock of all kinds may be obtained.

Catumbela being more healthful than Benguela, the place is rising in importance. There are two well-paved streets of fair-sized houses. The chief industry is sugar cultivation. Factories are established, and it is the market where the native caravans bring their rubber, ivory, and gum for barter. The two towns are connected by a railway and a well-kept road.

Benguela Bay.—About 10 miles southwestward of Catumbela River is Caboto Point, the northeastern extremity of Benguela Bay, an indentation nearly 7 miles broad and receding $2\frac{1}{2}$ miles. The shore is principally composed of a sandy beach, on which the town of Benguela is built. The inland country is high, attaining an elevation of 1,400 feet, 6 miles back from the town.

At the distance of 600 yards northward from Sombreiro (St. Philips Bonnet) Point there is a depth of $3\frac{1}{2}$ fathoms, inside of which the ground is rocky and uneven. From the head of the bay to the northeastward, past Covaco River and Caboto Point, the 3-fathom line, with patches of 1 fathom just within it, extends out 1 mile from the coast, outside of which it drops suddenly down to 5 and 10 fathoms. The shoal water off the anchorage is reported to be extending seaward.

St. Philips Bonnet.—The western side of the bay is of moderate height, very broken, and terminates in a promontory surmounted by a very remarkable square-topped hill, 393 feet, which from its peculiar formation is known as St. Philips Bonnet and may be recognized from a distance of 10 miles to seaward.

Light.—A fixed white light, elevated 420 feet and visible in clear weather 14 miles, is shown from an iron support near a white house with a red roof situated on St. Philips Bonnet. Reported unreliable.

Harbor lights.—A light, fixed red, is shown from above the tunnel into Benguela Fort; another, fixed green, from the northern tower of the church. The green light is the higher light; both are poor and unreliable.

There are small fixed red and green lights on the pierhead at Benguela, which can scarcely be distinguished from the lights in the town.

Buoy.—A spherical iron buoy, painted brown, is moored off the town in 7 fathoms for the purpose of marking the anchorage for the mail steamers. A red light is exhibited from this buoy.

Directions.—When coming from the southward or westward keep clear of the low sandy point of San José, lying 6 miles westward from Sombreiro (St. Philips Bonnet) Point, by bearings of St. Philips Bonnet or the light upon it. Having passed St. Philips Bonnet at a convenient distance, at night, bring Benguela Harbor lights in line 114° ; this mark should lead to the above-mentioned buoy.

By day a tunnel in the middle of the fort, appearing from the sea like a dark mark, brought in line with the church, bearing 114° , leads to the buoy.

If from the northward give Caboto Point a berth of at least 1 mile on account of the shoal extending 1,400 yards from it.

Anchorage may be taken up in about 7 fathoms water, but the depths here are reported to be decreasing. Avoid anchoring in the vicinity of the telegraph cables $1\frac{1}{4}$ miles westward of the buoy.

Town.—Benguela, the capital of the Province, covers a large tract of ground with wide lighted streets; it is laid out in large square buildings, possesses an imposing looking church, extensive public gardens, and a customhouse. An old fort, built principally of earth, stands on the sea face of the town, but it was reported that it would be demolished.

The population of Benguela (1909) amounts to about 5,000, including 1,000 Europeans.

Pier.—An iron pier about 200 feet long, on which there are 2 cranes of about 3 and 8 tons capacity, has been constructed abreast of the town, which much facilitates landing; there is a depth of 9 feet at low water at its extremity.

Trade.—The exports consist principally of india-rubber, wax, kernels, hides, and ivory, and the imports chiefly of cotton goods, guns, powder, metal ware, spirits, beer, provisions, etc.

Supplies.—Vegetables and beef are to be procured; also fresh bread, and a limited supply of poultry and eggs. The bay abounds with fish, but of a coarse description; they are caught in great quantities by the natives, who dry them in the sun.

Good water may be procured from the Covaco River. A small supply can be obtained from a tap near the inner end of the pier; this is laid on from waterworks situated on the banks of the Covaco.

Spring buck are fairly plentiful in the neighborhood, as also other small game. Inland, koodoo may be obtained.

Climate.—The town is situated on a marshy plain fronting the sea, which during the rainy season is almost inundated, causing exhalations to arise. March and April are the rainy months, which is accounted the most sickly period, but at no season of the year can the place be deemed otherwise than unhealthful, though the inhabitants, on the whole, give it a good name. Temperature ranges from 88° about March to a minimum of 52° about September.

Communication.—There are three steamers of the Empresa Nacional line during the month (irregular), four weeks from Lisbon, calling en route at the northern intermediate Portuguese ports.

Telegraph.—Benguela is connected by cables to Swakopmund and Loanda, and from thence to Europe. The cables cross Benguela Bay in a northwesterly direction, passing about $1\frac{1}{2}$ miles westward of the buoy off the town.

A railway unites Benguela to Catumbela, but it was reported to have stopped working some years ago. A line from Benguela to Bihe is under construction.

The observation stone at the telegraph office is situated in latitude $12^{\circ} 34' 43''$ S., longitude $13^{\circ} 23' 55''$ E.

Tides.—It is high water, full land change, in Benguela Bay, at 3 h. 0 m., approximate; springs rise $4\frac{1}{2}$ feet, neaps $3\frac{1}{2}$ feet.

Soundings.—That portion of the coast of the Province of Benguela situated between Palmeirinhas Point and St. Philips Bonnet is generally steep-to, and without any known offlying dangers excepting off Nova Redonda. Between Coanza River and Cape St. Bras, the 60-fathom line lies about 16 miles offshore, and thence the soundings decrease to 12 fathoms, at the distance of about 3 miles. Off Longo River the depth of 30 fathoms is found at the distance of 15 miles, but abreast of Pigeon Bay the depths of 60 to 70 fathoms are obtained about 11 miles from the land, and thence those depths run parallel with the coast at the same distance, to abreast of St. Philips Bonnet, off which the water is deep, there being 30 fathoms within 1 mile of the shore, increasing gradually to 45 fathoms, 3 miles from Sombreiro Point.

Farta Bay.—Westward of St. Philips Bonnet the shore continues bold for 6 miles, to Ponta das Vaccas, and forms several snug coves where boats and small craft may lie unseen. From Ponta das Vaccas the shore falls back to a sandy beach which forms Farta Bay. This bay offers no other resources than fish, which is plentiful; no water is to be obtained.

A Norwegian whaling company consisting of two tugboats and a parent factory ship, which was originally established at Lobito Bay, was transferred to Farta Bay in 1911.

San Jose Point, the western point of Farta Bay, is a rounded sandy tongue 1.7 miles northwestward from Ponta das Vaccas.

Anchorage.—There is excellent anchorage in this bay in about 14 fathoms about 800 yards from the shore, but the 3-fathom curve, which is steep-to, extends 600 yards from the head of the bay.

Tides.—It is high water, full and change, in Farta Bay, at about 3 h. 0 m.; the tide rises 4 feet.

The coast.—From San Jose Point the coast trends southwestward to Salinas Point, a distance of 22 miles. Along the whole of this portion of the coast the shore is very bold, there being 10 fathoms within 200 yards of the beach, which being of white sand, and projecting so far from the high land within, it is difficult to recognize until very close.

Caution.—For the above reason it is necessary to exercise extreme caution when approaching it at night.

This caution should also be exercised in rounding San José and Salinas Points. Many vessels have run on shore in this locality during fine clear nights.

Salinas Point is a low, rounded, sandy point, extending 5 or 6 miles beyond the high land. There is a reef southward of the point, and the water between it and Luash is shoal. The cautionary remarks respecting this part of the coast apply especially to Salinas Point. Southward of Salinas Point there are some houses and a group of coconut trees. About 5 or 6 miles northward of the point a settlement has been formed for the manufacture of salt, which is chiefly exported to Benguela and Loanda.

Light.—A fixed white light (reported unreliable), elevated 69 feet, and visible 14 miles, is exhibited from an iron light tower, 59 feet high, painted black, situated nearly 200 yards within Salinas Point. The lighthouse is a good daymark.

Current.—Along the coast northeastward of Salinas Point, the current sets away from the shore; southward of Salinas Point, between it and Equimina Bay, the current sets strongly in toward the land and should be guarded against, especially at night.

Luash Bay.—This port, about 5 miles southeastward of Salinas Point, is formed by the junction of the hilly country with the low shore extending from that point.

The small bay in the southern part of Luash Bay, adapted for small craft, is known as Cuio Harbor. There are several factories at Cuio, the settlement on the beach. The western extremity of the bay is a rocky ridge, known as Arco do Cuio (Arch Rock); it forms the natural mole, and is perforated.

Vessels of large draft must anchor outside in from 10 to 12 fathoms, but the anchorage is very bad in consequence of its being exposed to the whole force of the southwesterly winds which create a heavy swell. Close to Luash there is the mouth of the San Francisco or Copororo River.

Supplies.—Meat and vegetables are probably procurable.

The coast.—From Luash to Elephant Bay the distance is 21 miles in a southwesterly direction. For a distance of 12 miles from the former the land is high and steep, with several small sandy indentations on the coast as far as what is probably the Equimina River.

Equimina (Caminha) Bay is about 4 miles across from North to East Points in a northeast and southwest direction, with the remains of an extensive sugar estate about the center of the bay. The northern point of the bay is composed of a high white cliff, apparently of chalky formation.

Anchorage.—The bank of soundings adapted for anchorage is very narrow, and the water shoals very quickly within the depth of 20 fathoms, so that great care is necessary not to have too much way on in coming-to. A vessel may anchor in from 15 to 13 fathoms about 1 mile northeastward of the South Point, 300 yards from the coast. The anchorage is not sheltered in any way from the sea breeze and is not recommended.

Esquimina.—There was formerly a large and flourishing sugar and cotton estate about the center of the bay, the partially ruined buildings of which are still standing, and afford a good mark to recognize the bay by. The estate has been abandoned since 1889.

There is a sparse population of woodcutters, cattle herds, and fisher folk around Equimina.

The country abounds with game, principally antelope.

Landing.—Ships' boats can generally land on the beach when the tide is high, and in the morning before the sea breeze sets in; the best landing is at the southwestern corner of the beach.

Water.—Excellent water can be generally obtained from the river by digging in the sand when the river bed is dry.

Occasionally, when rains are falling inland, the river is a rushing stream 2 to 3 feet deep. The surf is always heaviest opposite the river mouth, and casks would have to be rolled along the beach from the landing at the southwestern corner.

Elephant Bay.—This bay, situated southwestward about 4 miles from Equimina Bay, is $2\frac{1}{2}$ miles across, 262° and 182° between East and Friar Points at its entrance, and from this line the bay falls back $1\frac{1}{2}$ miles to the southward. It is one of the best anchorages on this part of the coast, being perfectly secure and sheltered from the only winds that blow, viz, south-southeast to west.

There are two Norwegian floating whaling stations and a large steam factory on shore. The anchorage is practically untenable from May to November, on account of the whalers and the great amount of grease in the water.

Landmarks.—Making Elephant Bay from the northward, the buildings at Equimina are easily recognized, and on getting nearer the Friar Rocks open out; its position may also be known by a table-land about 1,130 feet high near the southwestern corner of the bay, which may be seen from a great distance to seaward and on which, near the top on the eastern side, the names of several British naval vessels have been lined out with stones and whitewashed; they can be read several miles off and form a mark for the bay. Some of the older names have become indistinct, owing to grass growing over them.

Resources.—There are a few natives living at the southwestern corner of the beach, who are employed by a Portuguese trader in catching fish, which are salted and sent to Benguela.

Fish consisting of mullet, bream, rock cod, and many other kinds can be procured with the seine in great abundance. Oysters can be gathered from the rocks on either side of the bay.

This is by far the best place on the southern coast for refreshing a ship's company after a cruise, for the climate is generally very salubrious, as is indeed the whole coast to the southward of Salinas Point. In April, 1899, however, the British naval vessel *Rambler*, after a fortnight's visit, experienced a severe epidemic of malarial fever; but this year had been unusually wet on the whole coast of Angola as far southward as Mossamedes, where also much sickness was reported. Mosquitoes were particularly virulent and numerous.

At Elephant Bay the crew of a vessel may enjoy a run on shore, as landing is easy, especially in the western part of the bay at the foot of the hills; they can wash their clothes, bathe, or haul the seine; the two latter must be done with caution, as sharks are often seen in the bay.

Water.—During the visit of the British naval vessel *Rambler* in April, 1899, the only water that could be procured, and that only sufficiently good for washing purposes was by sinking a cask near the mouth of the dry watercourse. This had been an exceptionally wet season. In some of the narrow gorges up among the hills a small quantity of water was met with, but generally with a strong disagreeable saline taste.

Anchorage.—Though the water in the bay is deep, it shoals gradually toward the beach, close to which there are only a few places with less than 4 fathoms; and the best anchorage is in 10 fathoms about 600 yards from the beach at the southwestern angle of the bay. The water in the bay is perfectly smooth, and the place is completely

beyond the influence of the rollers which occasionally set in along the whole coast.

Friar Rocks and Point.—These rocks, three in number, and about 14 feet high, are steep-to, and lie about 400 yards from Friar Point, the western point of Elephant Bay. Friar Point may be rounded about 400 yards off, but not nearer, on account of a rocky spit which extends about 200 yards off the point in a northerly direction.

Tides.—It is high water, full and change, in Elephant Bay, at 3 h. 10 m.; rise at springs 5 feet.

The current generally sets to the northwestward, but occasionally it turns to the eastward, in which direction it has been known to run at the rate of $1\frac{1}{2}$ knots; it does not appear, as in other localities, ever to change its direction to the southward.

Cape St. Mary.—This cape, on which there is a small pillar (said to have been erected by Diogo Cam, the Portuguese navigator, in 1486) which is visible only when close in, is about 17 miles southwestward from Friar Rocks, the intervening coast being indented and but little known. The mountains from this cape northward to Elephant Bay are of granite, interspersed with mica and quartz; one of the cliffs abounding in the former reflects the sun's ray to a considerable distance, like a vast mirror. The cape itself is in latitude $13^{\circ} 26'$ S., and of moderate elevation; on easterly bearings there will be seen a high hill (St. Marys Bonnet) of a rounded form, and apparently isolated, on the same line of bearing. Coming from the southward this hill is seen prominently above Cape St. Mary.

St. Mary Bay.—This bay lies immediately eastward of the cape, whence the bay is $1\frac{1}{2}$ miles across the entrance in an easterly direction, and recedes from thence about 1 mile to the southward. The area of the bay is greatly reduced by Bay Island, a white triangular-shaped islet, occupying the center of the bay. Small vessels might sail round the island, but between it and a rocky point which divides the sandy beach at the head of the bay into two parts there is a submarine causeway with less than 2 fathoms water on its shallowest part, though elsewhere around the islet it is steep-to.

The anchorage is well sheltered, but is only adapted for small vessels. Sailing vessels should not enter it unless with a fair wind, in consequence of the great depth of water. The best anchorage is in about 16 fathoms, sand and decayed coral, midway between the islet and the western shore of the bay, with Cape St. Mary bearing about 298° .

Pine Islet is a large black rock, 115 feet high, 3 miles south-southwestward from Cape St. Mary, and about 1 mile from the coast. Between the islet and the shore there are some rocks, but the passage has not been examined.

The coast.—On the western side of Cape St. Mary there are three coves or bays capable of affording excellent anchorage. Between Cape St. Mary and Cape Martha the coast is formed of granite cliffs, falling in most places steeply to the sea, especially between Espiegle Cove and St. Mary Bay, and interspersed with valleys. The valleys terminate in a broad white sandy beach. South of latitude $13^{\circ} 40' S.$ the valleys are not so frequent and the extent of the beach is less. The summits of these cliffs possess no characteristic forms, being mostly rounded off and covered with sparse vegetation.

Cape St. Martha.—This cape, of moderate elevation and forming a salient feature of the coast, lies 30 miles southwestward from Cape St. Mary. At Cape St. Martha is the termination of the high bold nature of the coast, and the shore presents a succession of small sandy beaches, separated by low, bold points. Eastward of the cape is the bay of St. Martha, a large indentation, the shores of which are unusually steep-to, which is also characteristic of the whole coast between Capes St. Mary and St. Martha, and, with the exception of Espiegle Cove, no anchorage ground can be obtained.

Espiegle Cove, an indentation on the southern side of St. Martha Bay, is the easternmost of two small bights and must not be confounded with the western one, which runs in about a mile in a westerly direction and, from its great depth of water, is appropriately named Bottomless Pit. Espiegle Cove is indented in a southerly direction, with a beach at its head, the shore generally consisting of high cliffs, with some small beaches between.

There is a fishing village here, but no supplies can be obtained. About 1 mile to the northward there are a few red houses, occupied by Portuguese traders who export fish (which are caught in large quantities in the Bottomless Pit) to Benguela.

Anchorage.—Espiegle Cove is a snug anchorage for two or three small vessels.

Matilhas Bay.—About 6 miles southward of Cape St. Martha is the northern point of Matilhas Bay, which is open to the westward and affords no shelter; the bay is 4 miles wide between its points, off each of which there is a bank which breaks. The northern point has a reddish tinge; at the head of the bay, where the Inamangando River enters the sea, there are several green trees and bushes and a few houses.

Tiger Bay.—This indentation lies in latitude $14^{\circ} 10' S.$, about 9 miles southward of Matilhas Bay, and is well sheltered from the prevailing southwesterly winds and swell, but its position is difficult to recognize on account of its southwestern point being very low and therefore not easily made out from seaward. Making the bay from the southward, the cliffs at 2 miles southward of Tiger Point appear to be composed of stratified beds of a red and yellowish color. The

latitude is the best guide to this locality, though two conical hills which rise from irregular ground surrounding the bay, backed by high mountains, will assist in the identification of the place.

Anchorage.—The southwestern point of the bay should be rounded 1 mile off in order to clear a shoal bank which extends some distance in a northerly direction, and then, steering in to the south-eastward, anchor in 6 or 7 fathoms; or anchorage may be had in from 8 to 10 fathoms, with the two conical hills 71° and 83° . In the bay the winds are regular, and the sea breeze sets in about 10 a. m. from the southwestward and veers round to the south-southeast about sunset, after which calms generally prevail.

This anchorage offers no resources, as the plain which surrounds the bay is without vegetation or water. There is a fishing station, consisting of a few native huts, inside Tiger Point; the fish are sent into the country. This locality was formerly frequented by elephants and tigers, hence the name of the bay, but game is scarce now and has gone inland.

Do Velho Bay lies 9 miles southward of Tiger Bay and has a sandy shore between its two sharp rocky points, but the bay is exposed and affords no shelter. In the northern part of the bay is the San Nicolas River, with a reef having but 10 feet water, extending $1\frac{1}{2}$ miles off its southern point.

A sugar plantation and rum distillery, employing 200 natives, is established here, from which rum and sugar are exported in coasting vessels; dried fish are also exported. The river in 1877 had no outlet, there having been no rain for 5 years.

Temporary anchorage may be obtained abreast the factory, in 5 or 6 fathoms.

Mount Velho, or Old Man Hill, 750 feet high, stands on the southern side of the bay and, from its remarkable truncated form, is an admirable mark for making Tiger Bay from the southward; it is of a darker color than the coast, and from some positions it seems to be detached. Farther inland to the southeastward is a range of table hills extending nearly north and south for a distance of 12 miles.

Rocks.—About 9 miles from the southern point of Do Velho Bay is a group of rocks close inshore, running parallel to the coast; the highest of these rocks is about 9 feet above the water.

Chapeo Armado.—The chart shows a village in this bay.

Mount Redondo.—This hill, of a rounded form 600 feet high, lies about 14 miles southward of Mount Velho; it is 10 miles northward of Moscas Bay and is often mistaken for Mount Velho.

Moscas Bay.—This bay lies 24 miles southward of Mount Velho, and is a small indentation with a sandy beach, and a stream which dries during the dry season; the place affords no shelter.

Beacon.—A beacon which forms a good mark is situated on the cliffs at the southwestern end of the bay.

Turtle Bay.—The northern extremity of this bay is known as Gertrude Point, and thence the bay to its southwestern point is 7 miles across, with a sandy beach between. The southwestern point, which though not very salient, yet affords some protection from the swell, is marked by a landslip of huge rocks on which the southwest swell breaks; the landslip is a good mark to identify the point by. This bay is more easily recognized from the southward than from the northward; and in it anchorage may be had in from 10 to 13 fathoms, good holding ground. There is a small fishing village in the southern and western part of the bay.

The coast between Gertrude and Giraul Points is of sandstone formation and falls generally from a moderate height steeply to the sea.

Pipas Bay.—For about 3 miles southward of Turtle Bay, the cliffs are perpendicular and of the same height to a small indentation, where good anchorage may be found in from 10 to 13 fathoms. A white house close to the beach is a useful mark for identifying the bay.

Giraul River.—From Pipas Bay, perpendicular cliffs again commence and continue of the same elevation southward to Giraul River, the entrance to which is fully open when bearing about 121° , and is easily recognized.

Cape Euspa is low and dark colored, with a few prickly-pear bushes on it, but without any remarkable feature.

Little Fish Bay.—The boundaries of this large indentation are Cape Euspa to the northward and Annunciation Point, which bears from the cape 200° 8 miles; from the line between these points the bay falls back to the eastward 5 miles. It is known to the Portuguese as Mossamedes Bay, after the governor of Angola, who discovered it in 1715. The town and colony here were established in 1840.

At the back of Little Fish Bay there are some high ranges of hills which show very white from the offing if the sun is on them; when their outline is once known they become excellent marks for recognition.

Caution.—The coast in the vicinity of Little Fish Bay is reported to be about $5\frac{1}{2}$ miles farther east than charted.

Giraul Point—Signal station.—This point, situated about 3 miles southward of Cape Eusepa, is rounded, rocky and steep-to, of moderate elevation; there is a flagstaff and signal station on it.

Light.—A fixed white light, elevated 33 feet, and visible in clear weather from 10 miles, is exhibited from an iron staging attached to a small white dwelling erected near the point.

The lightkeeper's house forms a good landmark for vessels coming from the southward.

Pier.—A pier has been built, alongside of which ocean-going vessels can lie in 10 fathoms. A railway of 6 miles in length connects the place with Mossamedes.

Shoal Point, which is sandy with several sandhills in its vicinity, is 4 miles 195° from Giraul Point.

Amelia Shoal extends 1.4 miles northeastward, with a breadth of about 600 yards, from Shoal Point, at which distance it drops rapidly into deep water. The shoal consists of sand, stones, and rock, with a general depth over it of 1 to 2 fathoms, but there is a patch of 2 feet, 800 yards within its northern extremity; this shoal is very dangerous, and the sea breaks heavily over it at intervals.

Clearing mark.—The conspicuous fort of San Fernando, open of Noronha Point, bearing 116° , leads well northward of Amelia Shoal.

The bay.—From Giraul Point the bold shore takes a rounded form to the eastward and northeastward for about $1\frac{3}{4}$ miles, where a sandy beach commences, and thence continues along the eastern shore of the bay to Negra Point, a bluff rocky promontory in the southern part of the bay, on which stands the fort of San Fernando; and near it to the westward the Governor's residence, a large conspicuous square two-storied building with central small tower and Santa Adria Church, with two towers.

At the head of the bay is the mouth of the Bero (Saone) River, which after flowing for about 30 miles becomes almost absorbed in the ground, before reaching the coast. Southward of the river the 3-fathom line extends 1,400 yards; near the river are the gardens and a chalybeate spring.

Westward of Negra Point the coast forms a sandy bar, bounded on its western side by Noronha Point, 3 miles southward from Giraul Point on the northern shore; from the line between these points the inner portion of Little Fish Bay falls back to the eastward 2 miles.

Noronha Point, which is a perpendicular sandstone cliff, 125 feet high; on its summit is a white lookout house in ruins, which is reported to be difficult to distinguish.

From Noronha Point the shore continues bold for 1 mile in a westerly direction to Wrangler Point, and remains so for 1,400 yards to the southward of that point, when it becomes low and sandy, to Shoal Point, nearly 1 mile westward, and terminating in Annunciation Point, 6 miles westward of Noronha Point, and which, being also low and sandy, is difficult to make out.

Directions.—It is hardly necessary to give directions for this port, as with the exception of Amelia Shoal, the bay is free from

dangers, and the anchorage clear except as regards the telegraph cables already described under Anchorage, below.

Anchorage.—The anchorage in Little Fish Bay is good, and is sheltered from all winds, excepting those from north to northwest; it is easy of approach, as the sea breeze blows across the bay, thus making a favorable wind in and out. The northern side of the bay is very deep, there being 284 fathoms $\frac{1}{2}$ mile to the southwestward of Giraul Point.

In the southern part of the bay there is a moderate depth of water, and good anchorage, out of the swell, may be had in the small bay between Noronha Point and Negra Point, in from 6 to 7 fathoms, about equidistant between the lookout house and Fort San Fernando, with the latter bearing 126° . Vessels can also anchor farther eastward off the pier, but must not anchor eastward of a line drawn 310° from the telegraph station on account of the telegraph cable.

A heavy sea usually breaks on Giraul Point, which it is dangerous to pass close-to under sail only, the wind not blowing home, and the water being too deep for anchoring.

Tides.—It is high water, full and change, in Little Fish Bay, at 2h. 30m.; rise of tide at springs $5\frac{1}{2}$ feet.

The city of Mossamedes is the principal fishing port of Angola, and the residence of the governor, and the most southern of the Portuguese settlements on the coast, except Port Alexander, borders the sandy shore within Negra Point; the houses are regular and the streets wide. A flagged roadway is made over the high beach leading to the gardens and plantations near the Bero River. The population of the town is about 4,500. Many establishments in the country are owned by colonists from Brazil, who farm the land, which produces abundantly. Cotton of a good quality is cultivated, and sugar and coffee are also amongst the products, besides which a considerable quantity of fish is cured for exportation.

A military hospital is situated $\frac{1}{2}$ mile westward of Negra Point.

A large number of natives are established in and around the bay, many of whom are intelligent; but there are also some natives of Port Alexander country, a miserable looking race who have no huts, but shelter themselves by a few palm-leaf screens.

Pier.—An iron pier extends from the shore to a depth of 15 feet at high water springs, with a line of rails connecting it with the customhouse.

The approaches to the pier are partially silted up with sand, and the ladder for boats landing is very close to the beach. As there is a heavy surf there, boats must be very carefully handled to avoid capsizing.

Lights.—Two fixed lights are exhibited from the extremity of the pier at Mossamedes, about 20 feet above high water. The eastern

light is green, the western red; each are visible about 3 miles. These lights are only occasionally exhibited.

Telegraph—Position.—Mossamedes is connected with Cape Town to the southward and Europe to the northward by submarine cable. The observation stone near the telegraph office is situated in latitude $15^{\circ} 11' 13''$ S., and longitude $12^{\circ} 9' 17''$ E.

Railway.—A survey for a railway from Mossamedes to Lubango, elevated 5,460 feet, has been made, and 70 miles constructed up to 1909. There is one train a day.

Communication.—The vessels of the Empresa Nacional Line from Lisbon call twice a month.

Coal.—About 260 tons of coal are kept in stock.

Supplies.—Bullocks are good and cheap; sheep, pigs, and fowls may also be procured. Cabbages, pumpkins, potatoes, and other vegetables, as well as oranges, melons, and citrons, are, as a rule, abundant, though dear; but the seasons vary. Fish in any quantity may be taken with the seine, the best time being early in the morning. Off Noronha Point, in deep water, large fish can be caught in great numbers with hook and line.

Water can be obtained from the mouth of the Bero River, which is $1\frac{3}{4}$ miles from the usual anchorage. It is procured by anchoring a boat close northward of the river, and hauling in to about 60 yards from the fresh water, filling with force pump and long hose. The Bero stream must not always be depended on for a supply of water, as during some dry seasons there may be one foot of water in it, but at others none.

The best time for watering is before the sea breeze sets in; during the rollers the water becomes brackish. Steamers would complete more rapidly by anchoring off the entrance; but it is not safe to do so in a sailing vessel, as the rollers may set in. It is probable that boats may procure water at the pier near the customhouse from the wells of the town; but water obtained at Mossamedes from the wells is brackish and only fit for cooking and washing.

Boats can water by means of hoses at the pier, but this method is very tedious and unpractical.

Trade.—The trade of Mossamedes appears to be decreasing, the chief exports being rubber, raw cotton, dried and salt fish, and cattle. The principal imports are groceries, cutlery, cotton and cloth goods.

Climate.—The climate is healthful (except near Bero River, where it is marshy), and is both cool and bracing from about June to September, the temperature often being as low as 42° ; the maximum in the opposite season is 86° .

Annunciation Point, the southern extremity of Little Fish Bay, is low and sandy, and off it a spit extends, upon which the sea breaks heavily at times, at the distance of 600 yards from the shore.

The coast.—About 8 miles southward of Annunciation Point there are some low rocky points, conspicuous by their dark color, which appear from a distance to be detached rocks; they form a good mark when making Little Fish Bay from the southward.

Near Annunciation Point hills and high cliffs commence along the coast, which extends southwestward about 28 miles to Cape Negro. Northward of the cape the land falls back into the large open bay of Cape Negro, presenting several rocky points.

Cape Negro is a remarkable headland, formed by a precipitous mass, upwards of 200 feet high, rising at the extremity of a low point, and resembling an island. It makes with a round, rugged, black face, whence the name, and is encrusted by different colored earths and sands abounding in fossil shells of various species, the most remarkable being of a spiral form. On the summit of the cape stands the pillar, or remains of a marble cross, erected by Diogo Cam, the Portuguese navigator, in 1486.

A bank, with depths of 4 to 6 fathoms, extends for the distance of about 1 mile off Cape Negro and southward of that cape as far as Sandstone Cliff, on the eastern shore of Port Alexander.

Flamingos River.—Two miles southward of Cape Negro, in a gorge between two points, marked by some trees, is the bed of the Flamingos River; its mouth is completely barred with sand during the dry season, and on its northern bank, a few miles inland, is the village of Lonchaut.

Coroca River.—About 2½ miles to the southward of Flamingos River is Coroca River, of which a bank extends for one mile, with about 4 fathoms water on it. At a short distance from the mouth of the Coroca are establishments where sugar cane, cotton, corn, fruit, and vegetables are cultivated, and herds of bullock and sheep are reared.

The rocks upon this portion of the coast appear to be of two or three different kinds, but principally of sandstone in horizontal strata, in which petrifications are embedded; others of primitive or volcanic formation are of harder and less regular structure.

Port Alexander—Sandstone Cliff.—About 6 miles to the southwestward of Cape Negro is Sandstone Cliff, 134 feet high, projecting from the interior like an immense wall; it is visible from a distance of about 16 miles, and forms a good landmark.

The port—Bateman Point.—Sandstone Cliff is at the eastern extremity of Port Alexander, the entrance to which lies 9 miles southwestward from Cape Negro. The port is a commodious harbor where vessels may lie in safety at all seasons of the year; fine weather generally prevails, and provisions can readily be obtained.

The peninsula forming the western and northern sides of the harbor is a low, steep, sandy tongue, terminating in Bateman Point, whence the mouth of the port is 1,600 yards across. From this line the harbor runs back in a westerly direction for a distance of $2\frac{1}{4}$ miles, the only danger being a bank of shoal water extending $\frac{1}{2}$ mile southward from the inner side of the spit which narrows the available anchorage space to 1,200 yards. This shoal is always covered, but its outline is at all times distinctly marked by discolored water.

There are two floating whaling stations and a steam factory on shore.

Light.—A fixed red light is shown at an elevation of 43 feet from the extremity of Bateman Point. It is visible 6 miles.

Dormer Bank.—This bank, the inner limit of which is not well defined, is of some extent, with general depths of 5 and 8 fathoms, the least known water being 3 fathoms, situated $1\frac{1}{2}$ miles from Bateman Point.

Tides.—It is high water, full and change, at Port Alexander, at 3 h. 0 m.; rise at springs 5 feet.

Directions—Anchorage.—When making Port Alexander from the northward it may be easily recognized by Sandstone Cliff, but the approach from seaward, or from the south, is attended with some uncertainty, as the sandy peninsula will then be confounded with the mainland; a mist is of frequent occurrence. A good lookout, however, from the masthead will be able to see the port over the sandy neck, also the village on the sand dunes along the southern side of the bay. On nearing the entrance, avoid bringing Bateman Point to the westward of 182° , until within 1 mile of it, or Sandstone Cliff bears 82° ; Dormer Bank will then have been passed, and Bateman Point can be rounded at a moderate distance, when an anchorage may be selected where most convenient.

Population.—In 1907 the population of Port Alexander had decreased to about 350 persons, who exist by fishing. There is a Portuguese resident, who is under the orders of the Governor of Mosamedes.

Trade.—The export trade of Port Alexander and Great Fish Bay is in dried fish.

Supplies.—No supplies are obtainable.

Good fresh water may be had on the southern side of the port by digging a few feet below the surface of the sand. Much fish may be caught with the seine, and shellfish can be found in abundance in the sands westward of the bay.

Salt abounds in the neighborhood, and at 2 or 3 miles from the beach there are large blocks of it covering the ground; the salt (which is mixed with sand) is used for curing fish.

The coast.—From Port Alexander the coast trends westward for 3 miles then southwestward for 3 miles, thence falling back to the southward forms a bay, the southern termination of which is Albino Point. The shore from Port Alexander is a low sandy beach, with heavy breakers, and the sea is always in a state of disturbance, occasioned by the currents which run past Albino Point in a violent and irregular manner. At 2 miles offshore there are depths of 30 fathoms.

Albino Point.—This point is very low and dangerous, and is said to be extending. Great caution is necessary when approaching it at night or in thick weather.

Great Fish (Tiger) Bay.—From Albino Point, the coast trends in a southerly direction about 56 miles to the head of Great Fish Bay; but from the above point to Tiger Point, the northern extremity of the long sandy peninsula forming the western side of the bay, the distance is 37 miles. The bay extends north and south 19 miles, the breadth at the entrance opposite Tiger Point being 6 miles, tapering off to 2 miles at its head.

The land on the eastern side of Great Fish Bay presents a succession of high sandhills, which rise suddenly from the coastline and extend in broken and irregular ridges far inland, without a vestige of vegetation, while the low, sandy tract of land known as Tiger Peninsula is only a few feet above the sea. Near the northern end of the peninsula it has a width of 3 miles, while at the head of the bay it is only 80 yards wide and but 2 to 4 feet above the level of high water.

Beacon.—On Tiger Point, the northern extremity of Tiger Peninsula, a beacon has been erected, consisting of a tripod, which is visible at the distance of 8 or 10 miles.

Light.—A fixed white light, visible 12 miles, is exhibited on the extremity of Tiger Peninsula.

Tiger Point can be rounded close-to.

Anchorage.—Anchorage may be obtained in a convenient depth of water, with good holding ground, in any part of the bay. The 3-fathom line on the western side of Great Fish Bay is steep-to, a deep gutter extending 12 miles to the southward, laying close off it.

The British naval vessel *Waterwitch* (1895) obtained good anchorage in 15 and 10 fathoms, mud, 2½ and 9 miles respectively, to the southward of Tiger Point, off the fishing stations.

There is no difficulty, when in Great Fish Bay, in fixing the position on the chart by cross bearings of the several fishing stations, which are correctly plotted. The red hut, 5¼ miles southwestward of Tiger Point, is a good mark that can be seen over the sand for some distance outside.

Tides.—It is high water, full and change, at 3 h. 0 m.; springs rise 5 feet, neaps $3\frac{1}{2}$ feet.

Supplies.—Fish may be caught with the seine, nothing else being obtainable. Water and all supplies for the use of the fishing stations here, which have greatly extended during recent years, are received from the northern Portuguese ports.

Soundings.—From Benguela Bay to Port Alexander, a distance of about 225 miles, the bank of soundings is narrow, and great depths are found close to the shore, thus rendering anchorage almost impossible, excepting in a few sheltered bays. In all cases, especially during light winds and calms, it is advisable to maintain a good offing, as the swell sets a vessel toward the shore. Care is required, on account of the light sandy nature of the coast and the extreme haziness of the atmosphere that generally prevails, not to overestimate the distance from the shore.

Between Port Alexander and Great Fish Bay the depths vary from 7 to 11 fathoms about 2 miles from the coast, increasing to 25 fathoms 7 miles offshore. The general nature of the bottom being sand or sandy mud.

General remarks.—Perhaps in no quarter of the world is the weather so fine as upon this coast, for southward of Benguela rain seldom falls, though heavy dews prevail at times. The prevailing winds are from south and southwestward all the year round, with variations to southeastward as land winds when inshore. At the distance of 80 or 100 miles from the land the southwestward winds become more regular. They generally veer round to the southward and eastward and imperceptibly unite with the southeast trade wind.

These southwesterly winds are frequently very fresh, creating a heavy sea, and the resulting swell breaks on the shore with much violence, rendering landing frequently impossible and always difficult excepting in bays sheltered from wind and swell.

The passage along the coasts of Angola and Benguela from the southward may be made with great facility, as both wind and current are generally favorable; but when proceeding to the southward it will be found sometimes that progress will be retarded when in the vicinity of Palmeirinhas Point, as the current generally sets to the northward with considerable force.

On such occasions it is advisable for sailing vessels to make a long stretch off the land to the distance of 50 or 60 miles, which will enable them to weather the point on the port tack; it seldom answers to work to the southward along shore. Along the rest of the coast the tacks should be arranged so as to be able to stand inshore the moment the sea breeze falls and thus take advantage of the land wind during the night. Nevertheless, vessels should avoid being becalmed

inshore to the southward of Cape St. Martha, for, as previously remarked, even in case of necessity there is no anchorage.

Vessels should not effect a greater offing than 50 or 60 miles, as beyond these limits the sea breeze declines in force and draws more to the southward, which would necessarily cause a loss of ground on the inshore tack, besides which they would lose the advantage of the alternate land and sea breezes which are almost invariably experienced closer inshore.

The following remarks relating to the African coast between Nazareth River and Little Fish Bay were written by a British naval officer (1885):

Seasons.—From May to November may be considered the fine season; during this period, particularly from the middle of June until early in October, beautiful bracing weather is experienced, though at times heavy dews fall, especially in July. When the dews are very heavy the land and sea breezes are invariably light, sometimes very much so, and consequently a passage along the coast then becomes tedious. The direction of the sea breeze is not to be depended on, as it may blow one day from the southward or southeastward and the next from southwest or westward.

The hot season commences in November and lasts till the end of April. This may be considered the sickly and rainy season, most rain falling during February and March; but southward of St. Philips Bonnet, Benguela, rain rarely falls, and frequently a season passes without any hazy weather like the smokes in the Bight of Benin. The sea breeze is uncertain at all times, coming one day early before noon and another late in the afternoon. But the earlier it sets in the longer it will last, though frequently when setting in late it makes amends by blowing very fresh, and it may happen at times that the late sea breeze may last till 11 p. m., whereas generally it seldom blows after sunset.

Invariably it will be found that the earlier the land breeze comes off the fresher it blows, and if it comes before 4 a. m. a vessel can reckon on making good progress. Sometimes it does not come until 7 or 8 a. m., when it rarely lasts, is generally light, and sometimes merges into the sea breeze, the latter drawing gradually round as it freshens. During the prevalence of thick weather and dews the land breeze is lighter than at other times and with the latter it is frequently little more than the cold air arising from the land as the sun descends but extending a very short distance from the shore.

CHAPTER X.

ASCENSION, ST. HELENA, THE TRISTAN DA CUNHA GROUP, GOUGH, BOUVET, THOMPSON, AND LINDSAY ISLANDS.

Ascension Island—General remarks.—This island, of volcanic origin and situated in the South Atlantic Ocean, lies between the parallels of $7^{\circ} 53'$ and $8^{\circ} 00'$ south, and between the meridians of $14^{\circ} 18'$ and $14^{\circ} 26'$ west. It is superficially bell shaped, $7\frac{1}{2}$ miles in length from east to west and $6\frac{1}{4}$ miles broad from north to south. The area of its base at the surface of the sea is 38 square miles, and its circumference about 22 miles. As the longitude of Ascension has been well ascertained, and the island lies in the track of homeward-bound ships from the Cape of Good Hope, it is generally sighted by vessels for the purpose of verifying their longitude though without any intention of anchoring, in which case the island may be passed on either hand as most convenient.

History.—The island was first discovered on May 20 (Ascension Day), 1501, by Joao de Nova Gallego, a Portuguese, and was visited two years afterwards by Alfonzo d'Albuquerque, who gave it its present name.

In the year 1815, the British Government took possession of the island of Ascension; and in 1821 the garrison was formed of a company of marines, and by detachments from this corps the improvements on the island have been conducted. The only buildings then existing were a barrack and storehouse near the present landing place. There is no doubt that better landing facilities would have been available at Comfortless Cove, but for the formation of the ground in its vicinity was not so well suited for the foundation of an establishment. Near Dampier Springs a house was built and gardens laid out for the cultivation of vegetables, but little more was then effected on the island.

The improvements went on and in 1827 roads were constructed from the several springs, 16 in number, to convey water to the garrison. In 1830 the collection of Government buildings and wooden houses was given the name of Georgetown, and a cottage for the governor was erected on the side of Cross Hill, overlooking the town, fort, and bay. The establishment at that time consisted of 110 marines and 50 Kroomen from the coast of Africa, who had erected batteries, built houses, made roads, constructed the pier, excavated

tanks, and walled-in turtle ponds, among other works, under circumstances of no ordinary difficulty. They had also formed gardens and had shown the mountain to be capable of cultivation, with the result that a small party might be maintained comfortably and even have the means of affording assistance in the way of fresh provisions to vessels requiring it.

By the month of March, 1833, the island was fortified at all accessible points, and the establishment numbered nearly 300 persons. A new battery, Fort Thornton, had been constructed close to the landing place, to mount seven guns; and near it a large covered tank, to contain 1,700 tons of water, supplied through iron pipes laid down from Green Mountain and Dampier Springs to the town.

Physical aspect.—The surface of the island is exceedingly irregular, and from the sea presents a rugged and uninviting appearance. The greatest elevation is the peak of Green Mountain, so called from the color of its summit, which is 2,817 feet above the sea, and may therefore be seen from a vessel's deck at a distance of 65 miles. From the summit of Green Mountain about 40 cones of various magnitudes may be seen, being extinct craters which at different periods have actually given vent to internal fires, and from many of them the direction of the lava currents may be traced on their way to the sea.

The Green Mountain is surrounded by numerous other craggy peaks of less elevation, having between them deep gorges and dark ravines filled with scoria, pumice stone, and other igneous products.

About $\frac{1}{2}$ mile inland from Southwest Bay and behind the lava currents lying near the beach there is a tract of land of comparatively smooth surface and of considerable dimensions; the soil is very rich, but so dry and dusty as seldom to exhibit any other verdure than a small amount of an annual herb named purslane. A little farther to the southeastward and behind some high, conical hills there is a sandy plain, having an area of perhaps 20 or 30 acres. This level is surrounded by the above-mentioned conical hills to the northward and on every other side by high ridges of lava, through which the rains have worn watercourses, by which considerable quantities of sand and pumice have been discharged into the plain.

Many of the rounded hills are fit for being planted with vines, as the soil is composed of ashes and a ferruginous earth, being a decomposition of calcined ores of iron. Of this description is Cross Hill, 868 feet high and overlooking the anchorage, but so dry and porous is the soil that no sooner does the rain fall than it is absorbed and disappears.

The chief cultivation is on the Green Mountain, where the rains fall more frequently than on the less elevated parts of the island. The principal garden is about 2,500 feet above the sea, and here the

climate is delightful, the average temperature during the day being about 75°, while at the landing place it is usually 85°. The temperature at the peak is still lower, and in the shade on the peak, with the sun shining, it has been known to fall to 60° at 1 p. m. The average height of the barometer on the peak is 27.75 inches.

The summit of Green Mountain, which is covered with rock roses and several species of fern and mosses indigenous to the soil, rises a graceful oasis amidst waste and desolation. The mountain is generally more or less obscured by mist some part of the 24 hours, and the condensation upon it supplies a large quantity of water, which is conveyed through pipes to covered tanks in Georgetown.

There is a road from Georgetown to the Green Mountain, the distance to the foot being 3½ miles and to the summit 6 miles. The neat little establishment known as the Mountain House stands at an elevation of 2,250 feet above the sea and is romantically situated on the brow of a hill. The view from this place over the whole island is awfully grand, for craters of extinguished volcanoes of various heights are seen in all directions, but not a vestige of vegetation below the summit of the mountain. A crater more rugged and remarkable in its appearance than the rest and known as the Riding School Crater lies to the westward of Green Mountain and is accessible by means of a road winding to its summit, which is walled in by a bridge of lava.

On the northern side of Green Mountain is the drip of water known as Dampier Springs, from the fact of its having been discovered by the celebrated navigator of that name, whose vessel, the *Roebuck*, foundered near Ascension in 1701, the crew saving themselves on the island, whence, after a detention of three weeks, they were taken off by an English ship.

Soundings.—The 100-fathom line extends about 2½ miles off the northwestern and southwestern coasts of Ascension, but off the other coasts the soundings are not sufficient to give its position with any degree of certainty.

The inhabitants are officers, seamen, marines, and Kroomen, under a governor, who is a captain in the marines. A depot of stores, provisions, and patent fuel is maintained here for the use of British naval vessels, and a small steam factory is available for minor repairs.

Water—Rainfall.—The general water supply at Ascension has been increased of late years, but the annual amount obtainable obviously depends upon the average rainfall over the water-catchment area, and this varies considerably. Using the average year's rainfall at the Green Mountain as a basis for measurement and comparison, it is estimated that a rainfall of 27 inches there (which was the average fall for a period of 19 years up to the end of 1895) produces

4,139 tons; a rainfall of 24½ inches, the average of the last 10 years, ending 1899, produces 3,347 tons; and that of 16 inches (to which it has been known to fall) produces 2,432 tons. During the last 10 years the maximum yearly rainfall at Green Mountain was 32.3 inches (1899), the minimum 17.4 inches (1898). The average rainfall at Georgetown is less than one-third that of Green Mountain.

The total tank capacity at Green Mountain and at Georgetown for storing water is at present 3,771 tons. The total quantity of water issued in 1899 was 3,084 tons. Little water can be spared for shipping; vessels must not, therefore, depend on being able to obtain it.

Condensers have been erected, so that in the event of a failure of a sufficient supply of water, it may be distilled.

Health.—The climate of the island of Ascension is singularly healthful, and its salubrity is attributed to its being situated in the heart of the southeast trade wind, which blows with a moderate breeze and cools, and ventilates every part of the island.

Again, the dryness of the atmosphere, the absence of marshy soil and decayed vegetable matter, or indeed anything likely to produce impurity, all contribute to the elasticity and buoyancy of the air, and render the island a most desirable spot for an invalid, who might be transferred from the landing place to the mountain summit in two hours, by a road practicable for horses, and enjoy in this short space of time a change of no less than 10° of temperature.

Fever has occasionally been imported from the pestiferous coast of Africa, but there is none endemic or peculiar to the island. A mild species of dysentery is the most common complaint, and beyond this there is none to be specified. The people residing on the island have a healthy appearance and, though exposed to the sun, no ill effects ensue. Sores heal readily, fractures unite quickly, inflammatory complaints are not obstinate, and, on the whole, the inhabitants enjoy uninterrupted good health. Such are the effects of pure air and so little is high temperature conducive to disease that the enfeebled invalid from Africa recovers energy and strength under the refreshing effects of the sea breeze.

Climate.—From October to March, inclusive, the hottest season at Ascension, during the day the maximum temperature ranges from 88° to 94° in the shade, but from March to September it ranges from 85° to 92°, and in the evening sometimes there is a fall of dew. The cool season is also the driest. The barometer never rises above 30.2 inches nor falls below 29.8, and it is lowest during the hot season.

The rainy season is March and August, and the quantity that falls in a year varies considerably, the annual average being small, and it is this circumstance that constitutes the great drawback to the natural advantages of the island.

During the months of March and April lightning is sometimes seen in the north and northwest, and thunder is occasionally, but very rarely, heard. In May the clouds have frequently a motion from the westward and northwestward against the usual trade wind, and light airs from those quarters will sometimes occur. The fact of the mountain being frequently enveloped in mist renders the habitations damp, though not unhealthful except for rheumatic disorders, which sometimes become acute. The rains in the lower parts of the island generally come on at night or early in the morning.

Products.—At the agricultural station the soil produced by the decomposition of the volcanic matter is rich and productive, though only a portion of it is cultivated; and here various kinds of moss, grass, heath, and flowers have been successfully planted, so that the botany of Ascension now boasts of 170 varieties.

Stocks, seeds, etc., were imported from England and horses from St. Jago, one of the Cape Verde Islands. Fruits, such as pines, Indian gooseberries, and plantains, have been successfully cultivated; and potatoes, onions, carrots, peas, French beans, and almost every esculent vegetable, have also been produced.

Supplies.—Vegetables are, of course, more or less abundant, as the season proves propitious or otherwise; but the sweet potato is more largely cultivated, being the most useful of the vegetables. Supplies for ships are extremely scanty.

The castor-oil plant thrives on the Green Mountain, and crops of Indian corn have also been produced; and since its cultivation it has been said the rain falls more abundantly than before. The stock, consisting of horses, cows, and sheep, is kept on the Green Mountain, where the residence is cool and agreeable. Partridges are scarce and are not allowed to be shot at. Rabbits are fairly plentiful; license to kill them can be obtained from the governor.

Turtle.—Ascension is visited by the sea-turtle between Christmas and midsummer, and it is supposed that during the above period each female makes three or four nests. This animal remains on the coast until 50 or 60 eggs are fit to be deposited in the sand, and then lands on the beach between 10 at night and 4 in the morning. She then proceeds 150 or 200 yards above high-water mark, digs a large pit about 8 or 10 feet in diameter and 2 or 3 feet deep, in which the eggs are deposited and carefully covered with sand, the process of incubation being left to nature.

In 9 or 10 weeks the young turtle breaks its prison and, working its way through the sand, gains the surface and immediately takes to the sea, after which they are never seen again until they are full grown. Should this short journey, however, happen in daylight, many of the young reptiles are picked up and devoured by the man-of-war birds, who are ever hovering over the turtle nests.

During the height of the season 50 or 60 turtle are frequently turned of a night when they come to deposit their eggs in the sand; on such occasions men are stationed during the night in the bays they frequent, to turn them over on their backs, in which position they are perfectly helpless, and are thence transferred to ponds in the town formed for their reception. The turtle when fully matured weighs from 400 to 800 pounds, but it is worthy of remark that no male turtle ever make their appearance on the beach. At times the turtle seem almost to forsake the island, as, for instance, in the season of 1874, when only 65 were taken altogether.

Turtle may be purchased, but the turning of turtle by strangers is strictly prohibited; and any persons guilty of a breach of this regulation is subject to a heavy penalty.

The turtle season commences on the 1st January and closes on the 30th of April, during which time no rifle firing is allowed.

Fish.—There is an abundance of excellent fish to be caught among the rocks throughout the year, such as rock cod, mullet, conger eel, cavalhoes, etc.; and are so plentiful that a boat's crew may sometimes catch sufficient to supply the crew of a cruiser. The best place for fishing is on the reef near the anchorage, using at first a piece of salt pork for bait, and afterwards baiting with fish to catch their fellows. Crayfish are also caught near the mouths of the caverns among the rocks toward English Bay, by hanging a piece of pork or fish a short distance below the water at the mouth of the cavern, when the crayfish will rise to the bait and may be taken by hand. Oysters are abundant, but not good.

Birds' eggs.—Among the articles of food obtained at Ascension the eggs of the tropical swallow, or "wide-awake," furnish an important item, and as many as 10,000 dozen of these luxuries have been taken in one week during the season, which is irregular and only occurs about three times in two years. In appearance the eggs resemble those of the plover, but though the bird is small, the size of the egg is nearly equal to that of the common fowl. The indigenous birds are nine in number and include the man-of-war bird, black and white, measuring sometimes even 7 feet from wing to wing; two kinds of gannet; two of petrel; and the boatswain bird.

Animals.—The only animals in the island are cats and goats; rats and land crabs also abound. The cats are numerous, but instead of destroying the rats, they prey on the sea fowl that frequent the island to lay their eggs. The goats, rats, and land crabs, being enemies to cultivation, are destroyed whenever the opportunity offers and will probably be ultimately extirpated.

The insect tribe are dreadfully annoying; flies are so numerous that at meal times they blacken the tablecloth; ants are innumerable, and mosquitoes annoying, while scorpions, centipedes, large spiders, and crickets abound. The only attractive insect is the mountain butterfly.

Clarence Bay.—The usual place of anchorage for vessels visiting Ascension is about 1,000 yards in length, and 400 yards in breadth, inside the line joining its boundary points, and is situated on the northwestern or leeward side of the island.

Pyramid Point is distinguished by a rock of this shape on it, and is a useful mark in the anchorage, which is about 1 mile to the southward.

Bates Point.—The northeastern point of the bay is a point formed of lava rock and has a rock 22 feet high off it and a shoal head of 3 fathoms 100 yards from it.

Fort Thornton, elevated 75 feet, stands on the southwestern point of the bay.

Red pole monument is a conspicuous white structure 90 feet high 550 yards southeastward of Fort Thornton.

Cross Hill—Signals.—About 1,500 yards southeastward from Fort Thornton is Cross Hill, 868 feet high; it has a flagstaff, from which signals, in connection with Lloyd's, are made to vessels entering the bay or passing the island.

Shoals.—An extensive area of shoal and foul ground, with depths varying from 1 to $4\frac{1}{2}$ fathoms in places, having rocky and uneven bottom, extends 1,200 yards northwestward from the coast between Fort Thornton and Catherine Point, situated 1,200 yards to the westward of the fort.

Buoys.—Two buoys, single spars, painted black and white, and surmounted with vanes, mark the shoals abreast of Georgetown. The outer spar buoy, marking the northwestern side of the shoals, is moored in 9 fathoms northwestward 1,600 yards from Fort Thornton. Vessels should not anchor to the southward of this buoy for the reasons already given.

The inner spar buoy lies 600 yards northward from Fort Thornton and marks the northeastern side of the shoals.

Clearing mark.—It will be seen by reference to the plan that vessels should not cross the line joining the two buoys; if approaching from the westward they should keep outside the outer buoy by bearings of Pyramid Point as soon as it can be made out until Cross Hill comes in line 126° with Redpole Monument, which mark clears the shoals to the northeastward.

Mooring buoys.—A mooring buoy (known as the Flagship's) lies in 9 fathoms 600 yards northward of Fort Thornton, but the moorings are not safe.

The "Flagship's buoy" merely indicates the spot where moorings were dropped some years ago. The buoy is secured to these old moorings by a light chain only.

There are 12 mooring buoys for the use of lighters and the island steamboat; also two buoys moored near the head of the jetty for

use in warping in lighters and also for boats to make fast to when waiting, as it is unsafe to remain by the jetty steps any longer than is absolutely necessary.

The jetty, with a depth of 9 feet alongside it, is immediately westward of Fort Thornton.

Warning.—A gun will be fired from the jetty if a ship is seen standing into danger.

Light.—A fixed red light is hoisted on the Temperley arm at the end of the jetty, when vessels are approaching, or are at anchor in the bay.

When there are vessels in the anchorage, and landing should not be attempted, a fixed green light is shown below the red light.

Georgetown consists of buildings, such as the barracks, hospital, residences of officers, etc., which stand high above the beach, and face the shore to the westward of Fort Thornton.

Coal.—There is a stock of 500 tons of coal, and patent fuel is kept. Between December and April loading and unloading is interrupted at times for many days by the rollers, and occasionally at other times in the year. It is carried on with difficulty in the time of single rollers.

Repairs.—There is a hand crane and steam hoist fitted with Temperley transporters at the jetty end, capable of lifting 10 tons and $1\frac{1}{2}$ tons, respectively, with a depth of 9 feet alongside at low water springs. The factory contains a small steam hammer and 12 machines.

Telegraph cable.—Ascension is connected with the universal general telegraphic system by submarine cables to Cape Town via St. Helena, and to England via St. Vincent, Cape Verde Islands, and to Sierra Leone direct. There is direct communication with Buenos Aires.

Time.—Local mean time, or the time of longitude $14^{\circ} 15' W.$, is kept at Ascension.

Communication.—Intermediate vessels of the Union Castle Line call once a month from Southampton outward, and also once a month from Cape Town homeward.

Tides.—It is high water, full and change, in Clarence Bay, Ascension Island, at 5 h. 30 m.; springs rise 3 feet.

Directions.—The coasts of the island are all clear and steep-to, excepting those already alluded to off Georgetown, and the northern point of the island, off which foul ground extends 400 yards, on which vessels have struck by endeavoring to haul too close round the point, and therefore care should be taken to preserve a sufficient offing when passing this locality.

Vessels intending to anchor in Clarence Bay should run along the northeast side of the island about 1 mile offshore, and after passing North Point at the distance of $\frac{1}{2}$ mile, alter course as requisite for the

anchorage, keeping about the same distance from the land. Sailing vessels must haul up on the port tack, when, with good management and attention to flaws, a vessel will generally reach the anchorage in Clarence Bay without tacking, taking care to shorten sail in time.

Anchorage.—A good outside berth will be found in about 11 fathoms, with Fort Thornton bearing 158° and Pyramid Rock 46° . The usual anchorage, however, is a little farther inshore, in 9 or 10 fathoms, just clear of vessels at the mooring buoys, but do not bring Pyramid Rock to bear northward of 40° or the northern end of the long beach eastward of 85° , as inshore of this the bottom is uneven and rocky. On anchoring a good scope of chain should be given, as sometimes the wind blows fresh off the high land. Vessels generally lie at single anchor with their heads toward the land, but instances have been known where vessels have tailed inshore, and as they are almost continuously rolling it is necessary, when selecting a berth, to bear this fact in mind.

The southwestern side of the bay should be avoided on account of the foul ground and the proximity of the rollers over the shoals.

Anchorage to the southward of this shoal ground is unsafe, and rollers prevent landing in this vicinity for several days in succession.

Prohibited anchorage.—Vessels are prohibited from anchoring off Comfortless Cove in the area lying between Bates Rock and Pyramid Rock.

Roller signals.—When landing is difficult or impracticable, roller signals are displayed from the end of the jetty. One checkered flag (letter N, international code) denotes that no loaded boats can land or leave the shore; flag N, with a small blue flag below it, indicates that landing must not be attempted.

Landing.—Ordinary (single) rollers, sufficient to stop lighters lying at the jetty, may be expected to present themselves about once a fortnight. The single roller, as measured on the steps of the pier, rises 5 feet 3 inches above the level of the sea and the double roller 10 feet 6 inches. When the single roller flag is up, boats may land with officers, etc., but they very often find difficulty in getting alongside the steps, and great caution is necessary. Here, as elsewhere, the third successive roller is generally the heaviest, after which the boat should shoot in close round Tartar Rock, steering well to the left of the steps until close to the rocks outside them, when hard-a-port, and it will be carried up to the steps by the set between Tartar Rock and Thornton Bluff.

When the double roller signal is hoisted no communication is allowed with the shore by night; nor by day without special permission, only granted in cases of emergency. On such occasions the boat is to be guided entirely by signals from the jettyhead as to the moment for putting in to the steps.

The following remarks are extracted from an interesting report on how the southwest and northeast rollers affect Clarence Bay, furnished in 1911 by Capt. Carpenter, R. M. L. I., commandant:

The southwest rollers form at a point slightly to westward of the outer spar buoy, turning off from the direction of the southwest swell and traveling in close to southward of the spar buoys, and along a direction parallel to the line of the buoys. Double rollers break at two points, (1) on crossing the 5-fathom contour line and (2) in the vicinity of the $2\frac{1}{2}$ to 3 fathom patch off Hayes Hill.

The northeast rollers turn off from the direction of the northeast swell and come in to the shore from a more northerly direction, increasing in height as they approach the beach and only breaking when they are about 150 to 100 yards from the shore.

There is always a bad swell at the pierhead during southwest rollers, but on ordinary occasions, as the rollers come in series with calm spells of from five to seven minutes, by waiting one's opportunity it is possible to get a boat alongside for a few minutes.

Occasionally parts of the southwest rollers get detached, pivoting round at right angles, and breaking on the rocks by Fort Hayes and against the jetty. This generally occurs when double rollers are on, and make it absolutely impossible to use the landing place.

When northeast rollers are on, they seem to get beaten down by the shoals on the west side of the jetty, and simply come in there in the form of an ordinary swell. It is quite possible to use the landing place when northeast rollers are on, and as long as they are not very bad, even lighters can be brought in and unloaded by using the long arm of the Temperley transporter.

In the combination of southwest and northeast rollers, which occurs at most twice in the year, the rollers meet, forming a nasty lumpy sea extremely dangerous to boats. I have seen a pyramidal mass of water rising up some 12 to 15 feet and then breaking about 50 yards to the northwest of Tartar Rock. This is in the direct track of boats passing from the jetty to the roadstead.

Neither the southwest nor northeast rollers break in the vicinity of the anchorage or lighters' moorings. The rollers cross these areas in merely the form of a heavy swell, and the farther one gets out seaward so the effect of the rollers diminish. Thus, although when double southwest or bad northeast rollers are on, a heavy swell passes over the lighters' moorings, it is nothing like so heavy at the old flagship's mooring buoy, and beyond that it is still less. Owing to this the lighters could always be used by ships lying at the anchorage, although at the same time it may be impossible to communicate with the shore.

Comfortless Cove.—About 1 mile to the northeastward of Fort Thornton is a small bay, with a spot of sandy beach known as Comfortless Cove, where landing may often be effected with comparative ease when it is quite impracticable at the jetty in Clarence Bay. The shore, however, is composed of a mass of irregular-shaped clinkers, which it would have required much labor to level as a site for the necessary buildings had the place been selected as a landing place.

Merchant vessels are on no account to use this landing place without the direct permission of the commandant.

The eastern coast.—From Fort Thornton the coast trends southwestward 1,300 yards to Catherine Point, and off this portion of the coast are the shoals already described. Thence the coast takes a southerly trend for a distance of nearly 2 miles to Southwest Bay, the intervening coast presenting a succession of small points. The 5-fathom line extends about 400 yards from it.

Southwest Bay is 1,800 yards between McArthur Point, off which shoal ground extends about 300 yards, and Portland Point, which is steep-to, to the southwest. The bay has a fine sandy beach, at the back of which is a steep lava cliff, its summit being 246 feet in height, and behind which again rise Red and Saddle Hills, 731 and 422 feet high, respectively.

There would appear to be fair anchorage in this bay, which is to a great extent free from northeasterly rollers. It is much frequented by turtle during the season, November to June.

A small buoy is moored about 200 yards from the shore, near the middle of the bay, for the use of the turtle boat.

South and east coasts.—From Southwest Bay round by south and east to Northeast Bay the coasts of the island are high, inaccessible, and iron bound, with deep water off it, and as nearly the whole of this portion of the coast is exposed to the full force of the southeast trades the sea breaks against the shore with much violence.

South Point—Islet.—There is an islet with a rock awash at low water 200 yards eastward of it in the approach to Mars Bay, about 1,000 yards westward of South Point.

Northeast Bay—Anchorage.—There is anchorage at Northeast Bay fairly sheltered from the prevailing wind and a landing place as shown on the plan. There is a buoy off the landing place. The beach here is frequented by turtle. Rollers are said rarely to occur here—about six times only in the year.

English Bay.—This bay is immediately westward of North Point and is about 600 yards across at its entrance, which has a head of $3\frac{1}{4}$ fathoms in it just inside the 10-fathom line. There is a landing place on the southern side of the bay.

Buoys.—The small buoys for the use of the turtle boats are only placed during the turtle season in Southwest, Northeast, and English Bays.

Rollers.—The rollers at Ascension and St. Helena break with great violence on the lee side of the islands, and arrive without any apparent warning. Their origin has been the subject of much discussion, and the general conclusion arrived at appears to be that these huge ocean ripples are the progressive undulations caused by distant storms in the Atlantic oceans of either hemisphere. It is stated that the heaviest rollers occur in the months of December, January, July, and August, and that the clear or muddy appearance of the water is a sure sign of the subsidence or rising of the rollers.

The rollers at Ascension are thus described by the surgeon of the British naval vessel *Chanticleer* in 1829:

One of the most interesting phenomena at Ascension are the rollers; in other words, a heavy swell producing a high surf on the leeward shores of the island, occurring without any apparent cause. All is tranquil in the distance, the sea breeze scarcely ripples the surface of the water, when a high swelling wave is suddenly observed rolling toward the island. At first it appears to move slowly forward, till at length it breaks on the outer reefs. The swell then increases, wave urges on wave, until it reaches the beach, where it bursts with tremendous fury.

The rollers now set in and augment in violence, until they attain a terrific and awful grandeur, affording a magnificent sight to the spectator, and one I have witnessed with mingled emotions of terror and delight. A towering sea rolls forward on the island, like a vast ridge of waters threatening, as it were, to envelop it; pile upon pile succeeds with resistless force, until, meeting with the rushing offset from the shore beneath, they rise like a wall, and are dashed with impetuous fury on the long line of the coast, producing a stunning noise.

The beach is now mantled over with foam, the waters sweep over the plain, and the very houses at the town are shaken by the fury of the waves. But the principal beauty of the scene consists in the continuous ridge of water crested on its summit with foam and spray; for as the wind is off the land, the over-arching top of the roller meets resistance, and is carried, as it were, back against the curl of the swell; and thus it plays elegantly above it, as it rolls furiously onward, graceful as a bending plume; while, to add more to its beauty, the sunbeams are reflected from it in all the varied tints of the rainbow.

Amid the tranquillity that prevails around, it is a matter of speculation to account for this commotion of the waters, as great as if the most awful tempest had swept the surface of the ocean. It occurs in situations where no such swell would be expected, in sheltered bays, and where the wind never reaches the shore. The strong and well-built jetty of the town has once been washed away by the rollers, which sometimes make a complete breach over it, although it is 20 feet above high-water mark. On these occasions, the crane at its extremity is turned round in various directions, as the weathercock is turned by the wind, and landing becomes impracticable for two or three days together.

Such are the rollers of Ascension, and like unto them are those of St. Helena and Fernando Noronha. The season at which the heaviest rollers prevail is from December to April, not but what they do occur at other periods, and they have been felt severely in July. Vessels in the bay are perfectly secure, and they have to apprehend no danger unless within the immediate influence of the breakers. Not only are the seasons of the rollers the same at St. Helena and Ascension, but they sometimes are simultaneous in occurrence.

The rollers occur in the most tranquil seasons of the year, when the south-east trade wind is often very light, where the vast volume of water is constantly impelled in one direction. There is then a tendency to a back set, or a rush of water in a contrary direction, and a tumultuous swell is produced wherever it meets with the resistance from the islands and banks on which they are based, as well as the shores of the continent. The long steep beaches of Ascension are admirably adapted for the full display of the effect which has been just described.

As before observed, the rollers of Ascension and at St. Helena are now understood to be caused by distant gales of wind, either in the North or South Atlantic, blowing in the direction of the island. The

heaviest rollers are those caused by the undulation of the surfaces of the ocean after a northwest gale in the North Atlantic, which takes place in the winter and spring of the year, from November to April; and its southeasterly direction brings it at once to the islands without any break, until it arrives at the anchorages; whereas those undulations coming from the South Atlantic have to circle round the islands and to reach the anchorage bays by a lateral course from the northeast and southwestern points of the islands, which, were they of greater extent than they are, would prevent the undulation from the southward curling into rollers at all.

At Ascension, the soundings are, comparatively speaking, so shallow, especially on the reef to the westward of Clarence Bay, that a very moderate swell arising from even a fresh trade wind is sufficient to cause the rollers to set in over the reef. This leads them right up to the landing place, and creates great inconvenience, which would in some measure have been avoided had the landing place been constructed on the other side of the bay from the reefs.

On the eastern side of the bay, the water offshore is deep enough to prevent the swell acquiring the character of breaking rollers, except in cases where the undulation comes from the northwest, and breaks directly upon the island. Even in this case, the guard ship formerly lying here was never disturbed at her moorings in 9 fathoms, which would tend to demonstrate that in the very worst cases the rollers do not actually break at that depth.

When the undulation of the ocean on its arrival at the island happens to coincide with the full or change of the moon, its depth and weight is enhanced; and to this cause is to be attributed the fact that, on the coast of Africa south of the Equator, the rollers are always worse at these seasons, when the South Atlantic gales from southwest may be expected.

Statistics of rollers in Clarence Bay, recorded over a period of 8 years, from 1904 to 1911, give a mean annual result of days on which they occurred in each month as follows:

| Month. | Southwest rollers. | | Northeast rollers. | |
|----------------|--------------------|---------|--------------------|---------|
| | Single. | Double. | Single. | Double. |
| January..... | 0 | 0 | 3 | 1 |
| February..... | 2 | 0 | 1 | 0 |
| March..... | 2 | 0 | 2 | 0 |
| April..... | 4 | 1 | 1 | 0 |
| May..... | 4 | 1 | 0 | 0 |
| June..... | 7 | 1 | 0 | 0 |
| July..... | 6 | 1 | 0 | 0 |
| August..... | 7 | ? | 0 | 0 |
| September..... | 4 | 0 | 0 | 0 |
| October..... | 3 | 0 | 1 | 0 |
| November..... | 3 | 0 | 2 | 0 |
| December..... | 2 | 0 | 6 | 1 |

St. Helena Island—General remarks.—This island is situated in the South Atlantic Ocean, at the distance of 1,700 miles from the Cape of Good Hope and 680 miles from the island of Ascension. Its position is between the parallels of $15^{\circ} 54'$ and $16^{\circ} 01'$ south latitude and the meridian of $5^{\circ} 39'$ and $5^{\circ} 48'$ west longitude, its length from east to west being 9 miles and breadth from north to south nearly 6 miles. The area of the island is about 47 square miles, or 30,000 acres, of which about 11,000 are cultivated; 7,652 are devoted to pasturage, and the remainder waste.

History.—The island is said to have been discovered by the Portuguese admiral, Joao da Nova Galego, on St. Helena Day, 1501. In 1513 it became the voluntary abode of Fernandez Lopez, a Portuguese nobleman, on returning in disgrace from India, who, being left here with a few servants, assiduously cultivated its resources. In a few years he was recalled to his own country and made known the advantages of St. Helena to the East India trade.

In 1588 Sir Thomas Cavendish, during his famous cruise around the globe, visited the island and found, as he said, "divers handsome buildings and houses, and a church tiled and whitened, very fair, a causey made up with stones, reaching to a valley by the sea-side." This valley he describes as "the fairest and largest low spot in all the island and is exceedingly sweet and pleasant and planted in every place either with fruit or with herbs."

For some time after the departure of Lopez the island does not appear to have been regularly inhabited; but in 1640 the Dutch attempted to establish a settlement here, which in 1651 they relinquished to the English East India Co.; and to this company the entire possession and sovereignty of the island was granted by Charles II in a charter dated April 3, 1661, in whom the property and sovereignty continued, except an interruption of a year, to be vested until 1836, when it was transferred from the company to the Crown. During the time the island remained in their possession the East India Co. greatly improved the cultivation and resources of the island.

On October 15, 1815, Napoleon Bonaparte arrived here in the British naval vessel *Northumberland* and continued in captivity until his death at Longwood House on May 5, 1821. His body was interred in Sane Valley, beneath a group of willows, his favorite haunt during lifetime. It was exhumed, for conveyance to France, on October 15, 1840, when the remains appeared almost untouched by the hand of time.

Longwood, the residence of Napoleon Bonaparte, stands on the plateau of Longwood, toward the eastern end of the island, containing the greatest quantity of level ground. A considerable portion of this plain is planted with trees, but is deficient in water. The plain,

elevated 1,762 feet above the sea, forms another point of view, and the scenery here is enlivened by a small winding stream, which falls from the heights into the valley and makes a little cascade.

The property of Longwood was purchased by Louis Napoleon, Emperor of the French, to whom and his heirs it has been conveyed in perpetuity. A French officer resides on the estate as guardian.

Aspect.—Although St. Helena from its position lies in the strength of the southeast trade wind, light airs are frequently experienced from the northwest for days in succession, thus causing a cessation of the trade. The island is usually sighted by ships from a distance of about 60 miles, when it makes like a huge pyramidal-shaped fortress rising from the sea, and presenting no sign of vegetation; but on nearer approach the prospect gradually improves, though the precipitous and almost inaccessible cliffs appear more striking when contrasted with the verdant tint which marks the summit of the hills, and gives an additional charm to the valleys in the eyes of the voyager.

The island is surrounded by a wall of precipitous cliffs from 1,000 to 1,800 feet in height, intersected by chasms serving as outlets for the streams from the high lands of the interior, and terminating in small coves more or less exposed to the fury of the waves; landing is almost impracticable, except on the northwestern or leeward side, though in very favorable weather it may be effected in Prosperous and Sandy Bays, situated respectively on the eastern and southern sides of the island.

Mountains.—The island is divided into two unequal parts by a lofty ridge of mountains, from 2,000 to 2,700 feet high, extending in a semicircular sweep from the southwest point to Stonetop Point to the southeastward. The principal eminences on the island are: Mount Actæon, 2,685 feet; Diana Peak, 2,604 feet; High Peak, 2,615 feet; Mount Halley, 2,467 feet; and Flagstaff Hill, 2,290 feet. Mount Actæon, the summit of the chain, is the highest peak of St. Helena; and this mountain commands a magnificent prospect of all the island, with its numerous ridges and hollows.

Numerous spurs branch off from the chain of hills, those to the northward and southeastward decreasing in altitude, but increasing in extent as they approach the sea, where they terminate in precipitous cliffs and form the valleys debouching on the coast. The spurs from the southwest of the ridge are suddenly broken about $1\frac{1}{2}$ miles from their commencement, the land which they originally supported having subsided, leaving but a wreck of the original formation, with here and there towering fragments of basalt, like the buttresses of a gigantic ruin.

These isolated masses are the evident results of some volcanic disturbance, and several of them assume curious and fantastic shapes. Two of the most remarkable are situated near the southern coast, and from some imaginary resemblance, have been named Lot and Lot's Wife; they are both formed of strangely contorted columnar basalt, and their summits are respectively 1,450 and 1,424 feet above sea level; the former rising 197 feet and the latter 160 feet from its base. Along the coast on this part of the island west of Sandy Bay there stretches for a considerable distance a stratum of horizontal columnar basalt, forming a stupendous wall 50 to 180 feet high. An isolated portion of this wall forms what is called the Chimney, a remarkable column of hexagonal basalt 64 feet high.

The island appears to have suffered at different periods from the effect of volcanoes and earthquakes; and by some it has been supposed to be the shattered remains of an ancient continent, connected in former ages with other rocks of the South Atlantic. The district of flat country comprising the plains of Longwood and Deadwood to the eastern side of the island would seem to support this theory, particularly as an indigenous tree (*Conyza gummifera*) which grows here is also found on Tristan da Cunha.

The remains of a vast crater are to be traced between Flagstaff Hill and the Barn on the eastern side of the island.

Limestone is found in different parts of the island; gypsum is found near Prosperous Bay, cornelian in Turks Cap Bay, and the honeycombed basalt and red tufa, which exist in large quantities, afford excellent building material. A layer of fossil shells (univalves) has been discovered near Flagstaff Hill, 2,000 feet above the sea.

Flora.—The botany of St. Helena is interesting, affording nearly 60 species of indigenous trees and plants, including the tallow tree and ferns of great beauty. Trees and shrubs from all parts of the world have been collected in the gardens of Plantation House, where the oak, bamboos, aloe, pine, etc., flourish together. The main ridge of the island is covered with a luxuriant vegetation of tree ferns and cabbage wood, nourished by constant moisture; and on descending from this elevation the hill sides are covered with the richest grass, and the watercourses overhung with bramble and fuchsia; while lower down are woods of Scotch fir, larch, oak, and willow.

On approaching the sea, vegetation gradually disappears, the summits of the hills within $1\frac{1}{2}$ miles of the coast being almost barren, excepting a scanty growth of samphire. In the valleys, however, where the water can be procured, the gardens produce abundance of fruit and vegetables, especially bananas and pumpkins. The island appears favorable to the cultivation of coffee and cotton,

particularly in the valleys to the southward of the main ridge, which are well irrigated and extremely fertile.

Fauna.—Sharks of great size and voracity are now and then captured; and during the month of August schools of whales (black fish) are frequently seen. No snakes or reptiles, except a few centipedes and scorpions are found on the island. Rats, however, are a terrible plague and nothing is safe from their depredations. The shellfish includes turtle, oysters, and two kinds of lobster.

Products.—The available land of the island is chiefly devoted to pasturage and the gardens to the cultivation of vegetables. Coffee has been cultivated with some success and attempts made to introduce the tea plant. The sugar-cane, cotton, and indigo have also been tried, but the rearing of cattle has proved to be alike the most useful and remunerative employment.

The island is capable of supporting a large number of cattle, and it has been found that the horned cattle and sheep do not degenerate from change of climate.

In the valleys by the shore, figs, oranges, pines, bananas, apples, peaches, guavas, and grapes are found; and potatoes, yams, pumpkins, cabbages, peas, and beans can be grown in plenty if cultivation, which of late years has been neglected, is attended to. Grain crops are very uncertain, sometimes suffering from drought and always from the depredations of rats, which are numerous and destructive. The potato is the principle article of agricultural produce, and those grown on the island are much esteemed. There are three crops during the year, and in scarce seasons they have sold as high as 35 or 40 shillings a bushel, but during periods of plenty as low as 8 shillings a bushel.

The flocks of wild goats which existed during the visit of Sir Thomas Cavendish have dwindled down to a very small number, a few being shot from time to time on the heights near Sandy Bay. Guinea fowl are also extinct, but the ravines are the resort of numerous coveys of the red-legged partridge, and the pheasant frequents the thick cover on the higher ridges. An indigenous bird resembling the sandlark, with long legs and gray body and wings, called by the islanders the "wire bird," is found here. Doves, Java sparrows, amaduvades, and canaries inhabit the gardens, the last-mentioned being remarkable for the richness of their tone.

The rocky islets around the coast swarm with sea birds, particularly the beautiful white bird (*Procellaria nivos*a); and the man-of-war bird and tropic birds are to be seen wheeling their flight high above the lofty pinnacles of the island. Sea fowl deposit immense quantities of eggs around the island, which in the fall of the year are collected for food. The shores abound with fish, to the extent of 70 species; among these mackerel and albacore are peculiarly abundant

and form the principal food of the poorer inhabitants; some descriptions of fish, are, however, very unwholesome.

Climate—Meteorology.—Of the climate under which such products are found, but little need be said, beyond the fact of its being considered salubrious. Speaking generally, the upper part of the island is healthful, but it is relaxing on the lower levels.

The temperature during the year, as a matter of course, varies according to the elevation and exposure of different parts of the island; for instance, St. Mathews' Vicarage, 1,905 feet above the sea, the maximum absolute temperature ranges from 69° to 80°; at Jamestown, 40 feet above the sea, from 78° to 93°. The temperature is also kept within reasonable limits by the cold waters of the South Atlantic Current; and by the trade winds, which act as a constant ventilator, and bring with them a canopy of clouds sufficient to afford shelter from the vertical rays of the sun, and to admit of labor and exercise being carried on with impunity during the heat of the day.

Seasons of drought have occurred, and cattle have perished for want of water; but rain is generally experienced at all seasons, especially during the months from March to August, the southern winter. The annual rainfall in higher localities is about 39 inches. Clouds predominate throughout the year. Lightning is a rare phenomenon at St. Helena, and thunder seldom, if ever, heard.

On or about April 28, 1870, the island was visited by a rare disaster, Jamestown having a narrow escape from being washed away, from a waterspout which burst somewhere in the vicinity of Diana Peak. Heavy volumes of water poured down into Sandy Bay and into the valley in which Jamestown stands, where bridges were destroyed, tanks broken, and the main street blocked by trees brought down from the surrounding hills. Much property was destroyed and washed into the sea; and many days were occupied in clearing the streets. It was the opinion of the governor that had this waterspout burst over the northern valley not a building would have been left standing in Jamestown.

The following remarks are by the surgeon of the British naval vessel *Chanticleer*, in 1829: "The climate of the island, considering that the sun is vertical there twice in the year, has a peculiar felicity of temperature, with mild and severe weather. The hills and uplands are frequently enveloped in fogs and mists, and even the lower parts of the island are shaded and screened by the passage of light clouds over the sun, whereby the effect of his rays is considerably mitigated. Frequently a light canopy of clouds obscures the sun for several successive days, and the fine breeze which then prevails produces a delightful tropical temperature. Shade is always to be found at St. Helena, for the deep gullies of the island are more or less protected from the sun's rays by the high hills which surround them.

“These circumstances affect the climate of Jamestown, on the northern side of the island, but in the hills a very different state of temperature is found, for there a small drizzling rain or a drizzling fog prevails more or less every day, and the trees drop perpetual moisture. There have been seasons, however, when the island has suffered severely from drought, which has destroyed both crops and cattle; and so solicitous are the people for the preservation of water that persons are interdicted under a severe penalty from cutting down trees. Much more rain, as is the case everywhere else, falls on the high lands than on the lower; and it is thought that the trees on the hills have considerable influence in attracting moisture.

Population.—The population of St. Helena in 1908 was 3,558 persons, resident and nonresident. The first record of the population dates back to the year 1683, when it was 500.

Industries.—The flax or phormium industry and lace making under Government control have been established. Flax is being planted all over the island, but at present there are not many hands employed in the mills.

Trade.—The imports consist chiefly of provisions and clothing.

The exports consist chiefly of fiber, tow, and hides.

Signals to be made by vessels approaching defended ports when inconvenienced by searchlights.—Any vessel approaching a defended port in the island of St. Helena when searchlights are being worked, and finding that they interfere with her safe navigation, may make use of the following signals, either singly or combined:

(a) By flashing lamp, four short flashes followed by one long flash.

(b) By whistle, siren, or fog horn, four short blasts followed by one long blast.

Whenever possible, both flashing-lamp signals and sound signals should be used.

On these signals being made, the searchlights will be worked so as to cause the least inconvenience, being either doused, raised, or their direction altered.

The signals should not be used without real necessity, as unless the vessel is actually in the rays of the searchlight it is impossible to know which searchlight is affected.

The signals are designed to assist mariners, and do not render the Government liable in any way.

James Bay, the port of the island, is a small indentation on the northwestern or leeward side, abreast of James Valley, bounded by two high rocky hills, Rupert Hill on the east, and Ladder Hill on the west, which gradually recede from each other as they approach the coast, where they terminate abruptly in two stupendous and perpendicular cliffs. The space inclosed between these heights is of a

triangular form, about $1\frac{1}{2}$ miles in length, and 350 yards broad at its base, which faces the sea.

Wreck.—The wreck of the steamship *Papanui* lies in James Bay. The bow has broken off and lies ahead of the main portion of the wreck. The after part is awash at the level of the upper deck, the remainder of wreck being well above water at all times. The stern lies 309° 378 yards from St. James Church spire, and the wreck, from ensign staff to jack staff, extends approximately 455 feet in a 93° direction.

Ladder Hill—Signal station.—The right or western side of the valley is bounded by the steep promontory called Ladder Hill, the ascent of which by a well-engineered zigzag road is very easy; a ladder also leads straight up its face to the artillery barracks. The position of the observatory on Ladder Hill is latitude 15° 55' 33.3" S., longitude 5° 43' 19" W. There is a Lloyd's signal station on Ladder Hill, the only one on the island.

Landing place.—The only landing places are in Rupert and James Bays.

Landing can usually be effected without difficulty at the wharf in James Bay in ships' boats, but the swell gets heavy for about two days each fortnight, at the time of new and full moon; it is then better to lie off near the landing place, and land by the shore boats, who back into it at a favorable opportunity.

Light.—A small fixed white light is shown from the landing place in James Bay to point out its positions to the vessels in the anchorage; the light is also of service to vessels making the port after dark.

Telegraph buoy.—A spherical buoy, painted white, with a white staff and black triangle, and marked "Telegraph," is moored 346° distant 600 yards from Munden Point. It lies in 23 fathoms of water, and ships should not anchor to eastward of the line from Munden Point through the buoy.

The town is situated in the valley between Ladder Hill and Rupert Hill, and is entered from the seaside through an arched gateway, within which on the left is the Government House, and on the right is the church, a plain but not inelegant building, with a remarkable needle-shaped spire, which forms a conspicuous object from the anchorage.

The houses generally are two stories high, neatly built in the English style, and whitewashed, and the shops are plentifully supplied with English and Asiatic products, but the prices are invariably very high. The town contains many little gardens, groves, and shaded walks, and extends the whole length of the valley, which gradually decreases in breadth as it recedes from the sea. The residences of the principal inhabitants are built on the higher and cooler

parts of the island, and one of the handsomest of these villas is Plantation House, an elegant mansion belonging to the governor, situated in the midst of extensive grounds, adorned with a variety of fine trees and shrubs.

Caution.—Owing to the action of the waves gradually undermining the wharf, there is now a cavity under the steps which is a source of danger to ships' boats in even a slight swell, and in anything approaching rough water the local boats dare not use the steps. The wall and wharf are in bad state of repair at other points owing to the same cause.

On the eastern side of the valley the carriage road called Side Path leads up to the interior of the island. This road, which was made with great labor and difficulty, has an easy ascent transversely to the level above, whence the prospect is striking and delightful, the view terminated by the sea horizon.

Pratique regulations.—No boat, except the health boat, is permitted to board or go alongside any vessel coming in before such vessel shall have been admitted to intercourse, which shall be indicated by a white flag at the main masthead.

Any vessels having a yellow flag hoisted at the fore is declared to be under quarantine.

Masters of vessels arriving at the port are not to leave, or permit any other person to leave, their vessel, either to come on shore or to go on board another vessel in the harbor, before receiving pratique from the health officer.

Hospital.—There is a hospital at Jamestown to which seamen of all nations are admitted by payment; seamen at the rate of 60 cents per day, officers of ships and private patients at \$2 per day.

Coal.—About 2,500 tons of coal are imported annually, 2,000 tons being usually kept in stock. There is a coal wharf, 640 feet long, with a depth of 10 feet of water alongside.

Coaling is slow on account of the limited capacity and small number of the lighters. A working party should be sent to assist in filling bags and loading lighters.

Supplies.—Provisions of all kinds are to be obtained here, and are as a rule plentiful and moderate in price. Water of excellent quality and abundant in quantity may be obtained at the jetty by application to the customhouse. There are two sailing water tanks of 20 tons capacity each, and some smaller ones, for supplying vessels if required. There are two cranes on the jetty of Jamestown for the use of boats.

Telegraph cable.—St. Helena is in direct telegraphic communication with Cape Town by submarine cable, and is also united with the general system at St. Vincent, Cape Verde Islands, by cable via Ascension. A buoy marks its position.

Jamestown is in telephonic connection with the distant parts of the island.

Communication.—The Union-Castle Co.'s vessels from Southampton every four weeks, and the homeward-bound vessels from the Cape every four weeks.

Tides.—It is high water, full and change, in James Bay, St. Helena, at 3 h. 11 m.; springs rise 3 feet.

Off-lying dangers—Barn Ledge.—Off Barn Point is a small detached rocky shoal, known as Barn Ledge, situated 1,650 yards 118° from the point, with a least depth of $3\frac{1}{4}$ fathoms water on it, and 9 to 12 fathoms within 200 yards all around.

This dangerous ledge is generally marked by a heavy ground swell.

Clearing mark.—To clear the edge on its eastern side, keep George Island (a detached rock off the southeastern point of the island) well open of King and Queen Point, until Sugarloaf Point opens to the northward of Barn Point.

Speery Ledge.—This dangerous reef, of small extent, with pointed rocks, having from 3 to 4 fathoms water over them, lies off the southern point of the island 1,800 yards 175° from the summit of Speery Island, and is generally marked by a heavy ground swell.

Between Speery Island and the ledge the depths are from 24 to 25 fathoms.

Clearing mark.—To avoid Speery Ledge, when approaching the anchorage from the southward, keep Gill Point open of Long Range Point, until West Point bears 336° , when this latter bearing will lead $\frac{1}{2}$ mile to the westward of the danger.

Directions.—As all ships should carefully avoid borrowing too closely on the weather shores of the island, it appears unnecessary to describe in detail the various salient points and indentations, more especially as the plan of the island contains all that is necessary to render navigation safe, and the only unseen dangers known to exist have already been described.

From the eastward.—If approaching the anchorage from the eastward—the best route—the eastern end of the island will easily be recognized by the Barn, a mountain, 2,028 feet in height, resembling a building of that kind; pass clear of Barn Ledge as described above. Steamers can alter course along the coast as necessary, but sailing vessels must haul up for Sugarloaf Point, and be prepared to shorten sail, for very heavy squalls come down off Flagstaff Hill and through Rupert and James Valleys. Sugarloaf Point may be passed within 200 yards, and the northwestern shore may also be approached equally near, as the shore is steep-to and without off-lying dangers.

On the western side of Sugarloaf Point is a small fort, and 1 mile farther on to the southwestward is Rupert Bay; immediately beyond

is Munden Point, after passing which Jamestown and valley will be open.

From the westward.—Vessels passing westward of the island, after having cleared Speery Ledge and rounded West Point, a steamer can then steer along the coast to the northward for the anchorage, but a sailing vessel should haul close to the wind on the starboard tack, and, passing at a moderate distance from the shore, will soon be in a position to anchor.

Anchorage.—Anchorage may be selected in the most convenient place where a berth may be available clear of any shipping, but in not less than 17 fathoms. If intending to remain any time, the best anchorage will be found northward of Ladder Hill, in 20 to 25 fathoms; this position will be clear of vessels arriving and departing. The bottom in the roadstead is coarse sand and gravel.

The bank off James Valley extends in a northerly direction, and slopes gradually from 7 fathoms near the shore to 50 fathoms at the distance of 1 mile, whence the water deepens rapidly to 100 fathoms.

Anchorage is to be obtained all along the shore to the southwestward of James Bay, as far as Lemon Valley Bay in from 15 to 28 fathoms, about 400 to 800 yards from the shore.

The chart also shows an anchorage about 400 yards off Egg Island and in Prosperous Bay on the western coast, in about 12 fathoms 400 yards offshore.

Prohibited anchorage.—In order to avoid fouling the telegraph cables anchorage is prohibited anywhere eastward of a line drawn 346° from Munden Point.

Rollers.—The most singular phenomenon connected with this part of the ocean is the setting in of very heavy continuous swells or rollers from the northwestward, which are most prevalent during the months of January and February, when the waves break on the leeward shore with astonishing grandeur. During their continuance landing is extremely dangerous, and can only be effected by watching the intervals between the groups of rollers.

These rollers, as previously stated, rise almost simultaneously at Ascension and St. Helena and without any apparent cause, for as a rule the weather is fine and wind light, although the spray of the surf beating on the beach rises to the height of 50 or 60 feet. Many lives have been lost in consequence of boats being capsized, and in February, 1846, 13 vessels moored near the shore were driven from their moorings and totally wrecked, and the wharves and batteries also suffered considerable damage.

The following table shows the average number of days for each month during which the state of the sea was as described. It is

compiled from the records taken at the landing place from 1891 to 1898:

| Month. | Calm. | Slight swell. | Heavy swell. | Rollers. |
|----------------|-------|---------------|--------------|----------|
| January..... | 6.1 | 13.6 | 6.5 | 4.8 |
| February..... | 4.0 | 10.0 | 9.0 | 5.0 |
| March..... | 11.8 | 13.0 | 5.0 | 1.2 |
| April..... | 11.0 | 13.5 | 5.0 | 0.5 |
| May..... | 13.0 | 12.0 | 3.7 | 2.3 |
| June..... | 9.5 | 17.0 | 2.5 | 1.0 |
| July..... | 11.0 | 15.5 | 3.5 | 1.0 |
| August..... | 15.7 | 10.0 | 3.5 | 1.8 |
| September..... | 10.0 | 16.0 | 3.4 | 0.6 |
| October..... | 8.0 | 15.0 | 7.0 | 1.0 |
| November..... | 10.0 | 9.6 | 8.4 | 2.0 |
| December..... | 6.1 | 14.7 | 6.8 | 3.4 |

Tristan da Cunha Group—History.—This group consists of three islands occupying a triangular-shaped area, lying between the parallels of $37^{\circ} 2'$ and $37^{\circ} 27'$ south latitude, and the meridians of $12^{\circ} 10'$ and $12^{\circ} 45'$ west longitude, of which the largest island, named after the discoverer, Tristan da Cunha, forms the north-eastern point, while the angles of the base are formed to the south-westward by Inaccessible and Nightingale Islands. The group appears to have been discovered and named by the Portuguese in 1506, and was explored and described by the Dutch in 1643, and by the French in 1767. Capt. Patten of the American ship *Industry*, and a part of his crew resided temporarily on Tristan Island, engaged in collecting seal skins, from August, 1790, to April, 1791. The commanding officer of the British naval vessel *Nereus*, who visited the island in January, 1811, found three Americans there who were going to remain for a few years collecting seal skins and oil for sale to vessels touching at the island. One of these men, Jonathan Lambert, on the 4th of February, 1811, declared himself proprietor of the island. He cleared a quantity of land and planted various seeds, some of which, as well as the coffee tree and sugar-cane, were supplied to him by the American minister at Rio de Janeiro. The whole, however, was abandoned, and formal possession afterwards taken in the name of the British Government by a detachment of troops from the Cape of Good Hope.

An official notice dated March 30, 1817, announced the occupation of the islands.

After the death of Napoleon at St. Helena on May 5, 1821, the British Government discontinued the occupation of the island, but several men and women remained behind.

Tristan Island—Aspect.—The island of Tristan, of circular form, is upward of 7 miles in diameter, and rises from the sea in the form of a truncated cone, at an angle of 45° , with a center peak 7,640 feet above the sea, and may be seen from the distance of 75

miles. The island is steep to all around, and excepting on the north-western coast near the settlement, where there is in front of the cliffs a comparatively low and grassy slope 100 to 200 feet above the sea, $2\frac{1}{2}$ miles in length and $\frac{1}{2}$ mile in breadth, terminating in Herald Point. The other parts of the coast consist of walls of inaccessible cliffs, from 1,000 to 2,000 feet high, off which, so far as is known, there are no dangers, with the exception of a reported shoal 1 mile eastward of South Point. The sides of the mountain mass as far as the central dome are covered with brushwood, intermixed with ferns and long grass; but higher up the mountain consists of bare rugged rocks frequently hidden by clouds, while the summit is covered with snow for the greater part of the year.

General remarks.—The inhabitants of Tristan da Cunha are British subjects. A detachment of artillery during the time Bonaparte was confined at St. Helena was stationed on this island, and on its withdrawal in 1821 one of the detachment, Corp. William Glass, who died in 1853, and two seamen of the St. Helena squadron, obtained leave to remain on the island. These were joined by men engaged in whaling. The present inhabitants are descended from them, but many families have left the island from time to time.

The area of ground fit for tillage is stated to be very limited, and the soil easily exhausted. It was very seldom that an attempt was made to raise a second crop from the same plot, for the ground required considerable manuring after having been once used, and it was found more profitable to clear fresh ground each time. The potato is the only crop which flourishes, about 20 acres being under cultivation, but the high winds of spring and a grub which makes its appearance in great numbers during autumn, are very destructive to this tuber, on which the islanders chiefly depended for food.

The island contains, according to the latest available information (1904), about 400 cattle and probably other live stock and poultry, and it was hoped that a regular export trade with St. Helena could be established. The supply of wood is very scarce, and promises soon to cease entirely, nothing growing much larger than a shrub. In 1856 it is said that there was an abundance of wood but that it was diminishing both in quality and quantity, owing to decay caused by a disease which first became apparent about seven years previously. The visits of the whales were gradually becoming less frequent, which increased the difficulty of obtaining clothing and other absolute necessities. The islanders considered that 200 was the maximum number of persons for whom subsistence could be procured with any degree of comfort.

The ascent of the peak is said to be easy by the islanders; and to terminate in a cone, consisting of black and deep-red lava ashes, in the center of which is an extinct crater nearly circular, $\frac{1}{4}$ mile in

diameter, and partly filled with fresh water, but its depth was unknown. No ancient lava streams are visible, nor any signs of former sea levels; no corals or shells have been found, and there are no thermal waters. The only indication of volcanic activity during the residence of the late Gov. Glass, was a slight shock of earthquake about seven years previous to 1856, when a portion of rock was precipitated from the mountain side. Several persons heard a noise at the time of the occurrence, though the day was fine and not in the thunder season.

Specimens of many varieties of ferns have been collected, and a plant which yields a beverage preferred by some of the islanders to tea, and which invariably spring up after a crop of potatoes; also a plant with red berries, somewhat resembling in taste insipid cranberries, of which a preserve is made.

All the cape sea birds, including albatross, visit this and the adjacent islands, and flock in great numbers from all parts of the horizon to roost on the heights after dark. The only land birds are a species of thrush, bunting, and common moorhen. The eggs are at times in great abundance, and the islanders collect them periodically.

There are no reptiles and very few insects.

Mammals.—Rats are common, and do damage to the potato crops. Wild cats are said to roam about the cliffs. Seals have ceased to frequent these islands, but sea lions and sea elephants exist.

Fish.—The island is frequented by salmon, mackerel, a large kind of mullet, a species of bass, and other fish. The blue shark abounds, and the islanders in consequence deem it unsafe to bathe in the sea. The sperm, the black, and the right whales are occasionally seen all the year around; the height of the whaling season appears to be from September to January, inclusive. The two first named seldom approach within 10 or 12 miles of the shore, but the right whale frequently ventures close in. There are no fresh-water fish on the island.

Climate—Health.—The climate of the island is mild but moist, and experience shows it to be healthful, as the settlers are remarkably free from disease, though it is said that vessels from St. Helena bring a malady resembling influenza.

Weather.—No meteorological register has been kept on the island except during the four months' stay of Lieut. Rice (August to November) in 1816, which, from observations taken for a period of 105 days, gave the following results: Mean temperature, 55° to 58° ; extreme range, 82° to 43° ; rain fell on 72 days (25 days in September); gales or strong winds blew on 45 days, southwest winds on 39, and northwest and west winds 29 days. Landing was safe on 63 days. From information derived from Mr. Taylor, the clergyman who resided on the island five years, it would appear that the thermometer generally stands at 68° in the summer and at 58° in the

winter, and that even during the night he had never known it to fall below 40° . Very thin ice is, however, occasionally found in winter, and in the depth of this season, in June, July, August, and September, the summit of the mountain is almost covered with snow and occasionally at other seasons of the year for days together. Snow and hail are sometimes, but very seldom, experienced on the lowland of the settlement.

The prevailing winds throughout the year are from the northward of west-southwest, the southern summer being distinguished by more frequent southwesterly winds than the winter season. August and September are the worst months, when the heaviest gales generally commence at north-northeast, and then, shifting to west-northwest, continue to increase until, still shifting with the sun, the storm reaches its height from the south-southwest quarter and blows furiously for days together, while the opposite swells caused by the various winds create a heavy confused sea as far as the eye can reach. The first warning of a northerly gale is a heavy surf setting in during a calm, and that even when the force of the gale at its height is not much felt at the settlement, as the velocity of the wind is decreased considerably by striking against the high perpendicular cliffs immediately to leeward of the anchorages. Southwest gales are severely felt at the settlement. The heaviest gale within the experience of the inhabitants occurred in October, 1855. The weather is generally the finest and most reliable when the wind has most westing, but it is uncertain at all times, especially when the wind is easterly.

During the four days' stay of a British naval vessel in 1873 (October) the wind varied from west-northwest through west and south to east-southeast, the force never exceeding 5, and being frequently 1. The weather was cloudy and the sea moderate. The temperature of the surface water was on an average from 2° to 3° higher than the air, the maximum temperature in the shade registered being 56° , the minimum 46° , and the mean 51° , while the mean temperature of the surface water was 53.6° . The air was dry and invigorating, the relative humidity averaging 77.

Fine season.—The inhabitants of Tristan de Cunha consider that November is not a good month for visiting the island, as the weather is always unsettled, and landing may be impossible for several days together. From the middle of December to the middle of March is the finest season; from the middle of January to the middle of February being nearly always fine with light winds.

Falmouth Bay is situated on the northern coast of the island. It may be considered to extend from Herald Point to a low point, Black Cliff Point, a distance of 2,300 yards. The curve of the shore is broken by a projection called Malcolm Point, extending 300 yards,

from which is a ridge of rocks named Julia Reef after a vessel of war lost here in 1818.

Herald Point, about 100 feet in height, is the northwestern point of the island; it is in latitude $37^{\circ} 2' 45''$ south longitude $12^{\circ} 18' 30''$ west, and may be used by passing vessels to check their chronometer.

Anchorage.—The anchorage, such as it is, is in 30 fathoms, about 1 mile from the shore, but in consequence of the uncertainty of the weather, anchoring should not be attempted by any but steamers, which, when anchored, should invariably keep steam up and the chain ready for slipping at a moment's warning.

Sailing vessels, when communicating with the island, should stand off and on. Anchoring even in the finest weather and smoothest sea is a most dangerous proceeding. A northerly gale may spring up suddenly at any time, preceded by a heavy swell, which may snap the chain, jerk the anchor home, or cause the vessel to founder; if she escaped this she would find herself on a dead lee shore with small hope of clawing off. But there would be no risk in holding several days' communication by boats, the ship standing off and on, especially if the season happened to be between October and April, which is the summer period here.

The marks for anchoring or communicating with the settlement while under way are Hardy Rock (120 feet), just open of Herald Point 212° and Black Cliff Point 148° .

Landing.—The usual landing is in Falmouth Bay on the dark pebble beach 200 yards eastward of a cascade and near a steep roadway cut laterally in the cliff—this is also the only spot free from bowlders.

Landing can easily be effected excepting in northerly winds, and during the time of rollers, when it is dangerous; it should be made in boats, which can easily be hauled up on the beach and a steer oar used. Heavier boats can be moored off the beach. The surf on the beach is much modified by kelp (*fucus giganteus*), which extends 600 or 800 yards from the shore; it is strong and firmly rooted on the bottom, which enables boats to make fast to it, though they are necessarily less manageable when in it.

Sudden changes in the weather may prevent boats regaining their vessels.

It is said that excepting in the very worst weather, a landing with safety to life, and generally to the boat, could always be effected somewhere under the lee of the island, there being about 1 mile apart small indentations, with pebbly beaches, in the steep cliffs which surround the island.

Tides.—It is high water, full and change, in Falmouth Bay, Tristan da Cunha Island, at 0 h.; tide rises at springs from 4 to 6 feet.

Current.—The current, according to the statement of the islanders, generally sets to the northeastward (excepting close inshore, where there is a slight drain to the southwestward), but occasionally it changes to the opposite direction.

Settlement—Population.—The settlement consists of about 16 substantial stone cottages, thatched with a species of long grass. The population numbers about 100. Twenty vessels called in 1904.

Supplies.—There are bullocks, sheep, pigs, and poultry on Tristan da Cunha. The produce of the island is chiefly potatoes, but cabbages, onions, etc., are also grown. There are apple and peach orchards on the southern side, the fruit is, however, of little good, being small and sour; there is no grain. Abundance of fish may be caught by hook and line.

Firewood is scarce, but water plentiful, being supplied from a spring at the back of the settlement, and thence tumbling over the cliffs 15 to 20 feet, forms the miniature waterfall marked on the chart. Ships may obtain water with their own boats by lying outside the surf and filling the casks with a hose connected with the waterfall. The assistance of the islanders may always be relied on.

Rollers.—The following information respecting the rollers, which are occasionally experienced here as well as on the other islands in the South Atlantic, is derived from the islanders themselves, but unfortunately no register of the date of the actual occurrence of them has been kept. The rollers do not seem to be affected by lunar influences, but set in at all times during winds and calms; in the latter case they are always heavier. The heaviest rollers occur from December to February, three of the finest months, when they sometimes last three or four days, and this remark, according to the account of whalers, also applies to Gough and other islands in the southern hemisphere; but they are more frequent during the winter months.

Inaccessible Island.—This island lies 20 miles westward from Tristan da Cunha; it was partially surveyed by officers of the British naval vessel *Challenger* in 1873 who landed here. It presents a high mass of rock with a tabled summit, and is superficially diamond shaped, its north and south points being $2\frac{3}{4}$ miles, and its east and west points 3 miles apart. The highest peak, situated on the western side of the island, is elevated 1,840 feet; it is said to be a crater with water in it. The land thence slopes irregularly, terminating on all sides in precipitous cliffs, about 1,100 feet in height. On the southern point of the island is a remarkable rocky conical hill, 1,140 feet high, and 1,200 yards northwestward of this is another rocky cone 690 feet high. The northwestern coast is low, and the cliffs there recede sufficiently to allow the summit of the island to be gained with some diffi-

culty. On the northeastern side of the island the shore is also low, and there are two waterfalls, the southern one being the larger and more conspicuous.

On the southeastern and southwestern sides of the island the cliffs rise abruptly from the sea, and here the island appears to be literally inaccessible.

Southward of the eastern point of the island there is a rock 3 feet high, 200 yards from the shore. Off the southern point are two rocks, one a pyramid 60 feet high, with a rock awash about 1,000 yards westward of it, the other a low rock, 3 feet high, close eastward of Pyramid Rock. Off the southwestern side are two rocks awash, the western one of which is $\frac{1}{2}$ mile from the shore, and off the northeastern side is a rock 2 feet high 200 yards from the shore.

Soundings of 50 to 90 fathoms were obtained at $1\frac{1}{2}$ miles from the coast on all sides of the island. Kelp grows on the northeastern side in a depth of 12 fathoms at $\frac{1}{4}$ to $\frac{1}{2}$ mile from the shore.

Anchorage may be found just outside the kelp in 15 fathoms, abreast of the 2-foot rocks, but this anchorage should be used with caution, as the survey of the island is not complete.

Landing.—There is good landing near the southern waterfall, but the cliffs are precipitous, and it is impossible to proceed beyond the narrow strip of coast bordering the cliffs.

Supplies.—The island is uninhabited, but wild pigs are to be found on the irregular ground above the cliffs; these animals feed, however, on sea birds' eggs; their flesh is therefore fishy and unpalatable. Goats formerly existed here, but they have all been shot. Fish are abundant, and may be readily caught by hook and line.

The penguins, it is stated, make their appearance at Inaccessible Island in the month of June and soon afterwards begin to lay their eggs. The birds disappear for a short time in January after the eggs are hatched and the young are ready for the sea, and then come back to moult, finally leaving the island in April.

Nightingale Islands, a group of three, in a line north and south, and lying southwestward about 20 miles from Tristan da Cunha, and southeastward 11 miles from Inaccessible Island, were partially surveyed by the officers of the British naval vessel *Challenger*, 1873. The group consists of Nightingale Island, the largest, and Stoltenhoff and Middle, the smaller islands, with several rocks close to their coasts, but there is apparently no outlying danger.

Nightingale Island is 1 mile long east and west, and $\frac{3}{4}$ mile wide, and has two peaks, the eastern one of which is rugged and precipitous, 1,105 feet high, and appears conical from the northeast and southwestward. The other, 960 feet in height, slopes gently on all but its southern side. With the exception of the northeastern

coast its sides are precipitous and cut into deep recesses and caves. A few sunken rocks border the southern coast, but they are easily seen.

Stoltenhoff Island, which is the most northern, lies 1,600 yards distant from the main island and is a flat-topped, precipitous rock 800 yards long, 300 yards broad, and 325 feet high, formed in one large and two small pieces by narrow chasms, which can only be distinguished on one particular bearing.

Middle Island is 600 yards long, 400 yards broad, and 150 feet high, with a remarkable pin rock about 30 feet high off its north-western side.

There is a channel between it and Stoltenhoff Island $\frac{1}{4}$ mile wide, which appears to be deep. The passage between Middle and the main island, 300 yards wide, is wholly blocked up with detached rocks.

Kelp extends $\frac{1}{4}$ mile from the eastern side of the islands, but there is little or none on the southern or western sides, which are the most exposed.

Soundings, from 50 to 200 fathoms, coral, were found at about 1 mile from the shore.

Landing.—There is no beach of any kind, but an easy landing can be effected on the rocks at the northeastern point of Nightingale Island. There is a small rock, awash, 50 yards from the point, which must be looked out for when landing.

Water.—Fresh water may be obtained in a cave close to the landing place. It is reported that there is fresh water in the crater on the summit.

The soil of Nightingale Island is said to be impregnated with alum or some such substance, which renders the water undrinkable, except that from the crater lake, which is pure.

General remarks.—There are a number of wild pigs on Nightingale Island. During the breeding season of the penguins, from August to November, it is difficult to walk on the islands, the birds and their nests occupying almost every inch of the damp ground between the tussock grass, 8 or 9 feet high, which overruns the islands.

Inaccessible and Nightingale Islands were formerly visited, though very rarely, by the settlers of Tristan da Cunha for seals and sea-elephants, which are now, however, said not to frequent this group of islands.

Gough Island.—Gough Island, which is about 230 miles southward of Tristan da Cunha, derives its name from the captain, who sighted it in 1781, in the ship *Richmond*, on her voyage to China, but there is reason to suppose that the original discoverers were the Portuguese.

Gough Island is about 8 miles in length in a northwest and southeast direction, by about 4 miles in breadth, with precipitous cliffs on its northern and western sides; these attain a height of about 1,000 feet near North Point, decreasing gradually toward the south end of the island to about 100 to 200 feet. From these cliffs the land rises in rugged peaks to the center of the island, which attains a height of 4,380 feet. On the eastern side there is a rocky beach $1\frac{1}{2}$ miles in length, unbacked by cliff, from which a valley offers apparently the only accessible way into the interior.

In this valley ruins of huts of corrugated iron have been seen. At the landing place a mountain torrent comes down a picturesque glen. Vegetation was very plentiful, the whole island being clothed in green. Tussock grass and a small stunted tree (*Phyllica nitida*) both grow in abundance, even in the more exposed places. Ferns and mosses are luxuriant near the numerous waterfalls and along the banks of the streams. But the southern slopes appear more fertile than the northern, which are rocky and barren. The shores are fringed with kelp, though not thickly. Penguins and other seabirds abound, finches, waterhens, and a few insects have been seen, but no other animal life has been observed. Water in plenty runs down the cliffs in cascades, except at the southern end.

Penguin Islet is on the eastern side of Gough Island.

Anchorage.—Gough Island may be approached to within about 1 mile, except off its northwestern point, where a reef which breaks heavily extends to about that distance. The island is apparently steep-to on all but its eastern side, where depths of about 20 fathoms are found at from $\frac{1}{2}$ to $\frac{3}{4}$ mile offshore. Here temporary anchorage (keeping steam up) might be taken, choosing the position according to the direction of the wind. A good position appears to be just northward of Penguin Islet, abreast a cove, where there is a depth of 17 fathoms, soft sand, with the islet in line with Southeast Point. The British naval vessel *Royalist* took up this position in January, 1887, but it was not thought prudent to anchor on account of the swell then prevailing, the wind having been blowing fresh from southwest for two days previously.

Anchorage for sailing vessels is obviously impossible here.

Landing has been effected on the stony beach abreast the huts, though not without risk on account of the swell; also on the north side, just eastward of one of the islets called Lots Wife; and easily in the cove between Church Rock (so called from its strong resemblance to a church with a high spire on its western end) and Penguin Islet, protected by the northeastern point; but the best position for landing will obviously depend on the direction of the wind and swell around the island at the time.

Bouvet or Liverpool Island was first sighted on January 1, 1739, by M. Bouvet in the French ship *Aigle*. Not knowing it to be an island he named it Cape Circumcision, and placed it in latitude $54^{\circ} 00'$ south, longitude $4^{\circ} 30'$ east. Though he remained in the neighborhood for nine days he was unable to land on account of the inaccessible nature of the coast and the large quantity of ice surrounding it.

In December, 1822, the master of the American schooner *Wasp* is stated to have landed on the northwestern side of the island, where anchorage was found under the lee of some grounded icebergs about $\frac{1}{2}$ mile offshore.

On December 10, 1825, the island was sighted by the whalers *Sprightly* and *Lively*, naming it Liverpool Island and placed its center in latitude $54^{\circ} 15'$ south, longitude $5^{\circ} 00'$ east. The island appeared to be from 9 to 12 miles long in a north and south direction, the northern end being high and the southern low, the center being covered with snow; it appeared to be of volcanic origin, and to be like a large cinder surrounded by high cliffs and covered with snow. Landing was effected with difficulty near the southwestern point and possession taken in the name of King George IV. On a second occasion, 5 days afterwards, landing was effected and a few sealskins obtained, the boats being absent for six days. Soundings of from 35 to 40 fathoms were obtained 1 mile off the southern coast. An isolated rock, nearly awash, was seen about 6 miles to the northwestward of the island.

In 1843 the British naval vessel *Erebus* searched unsuccessfully for it, but does not appear to have been aware of the *Sprightly's* visit.

In November, 1898, the island was searched for unsuccessfully by the German deep-sea exploration vessel *Valdivia*. Its position must, therefore, be considered uncertain.

Thompson Island was reported in 1825 by Capt. Norris, of the whaler *Sprightly*, to be situated 24 miles to the northeastward of Bouvet Island. He describes it as a small low island, with three rocks called the Chimneys situated 4 to 5 miles to the southeastward and another rock 3 miles farther to the southward.

This island was searched for unsuccessfully by the *Valdivia* in 1898; its position consequently must also be considered doubtful.

Lindsay Island, reported in 1808 by the whaler *Swan* to be situated in latitude $54^{\circ} 24'$ south, longitude $3^{\circ} 15'$ east, appeared to be about 5 miles long from east to west, the eastern point being low and the western point high, the whole island being covered with snow and surrounded by ice to a distance of 3 miles from the shore. No landing was effected during a stay of several days.

In November, 1898, the island was searched for by the German deep-sea exploration vessel *Valdivia*, which sighted it on the 25th very nearly in the above position. The island appeared as a single volcanic cone, about 3,068 feet high, surrounded by precipitous cliffs and almost entirely covered with snow and ice, the breaks in the cliffs being filled with glaciers and with no trace of vegetation or life, with the exception of cape pigeons and storm birds (*Pagodroma nivea*), of which there were great numbers. A running survey of the island showed that it is about 5 miles in length from east to west and $4\frac{1}{4}$ miles from north to south, and its center was placed in latitude $54^{\circ} 26'$ south, longitude $3^{\circ} 24'$ east. Neither anchorage nor landing place could be found. At the southwestern point the cliffs attain a height of 1,100 feet and an isolated rock is situated off it. The south and east coasts are not so steep as the north and west, and it appeared possible that, under favorable circumstances, landing might be effected on the eastern coast, but the island is too small to afford much of a lee.

CHAPTER XI.

GREAT FISH BAY TO ORANGÉ RIVER.

General remarks.—This chapter is a continuation of the directions contained in Chapter IX, which terminated with the description of Great Fish Bay. From Tiger Point the land trends southward about 20 miles to the isthmus, and thence the general trend of the coast is to the southward as far as Cape Frio, a distance of 96 miles.

The whole of this coast, extending from about Cape Negro to beyond Ichabo, is a desert region of arid sands, and nearly rainless, though at times heavy dews prevail.

No landing place for stores, etc., could be discovered in 1879, when an examination was made with that object.

Game is very abundant, and an account of a journey into the interior is but a narrative of encounters with ferocious animals, or herds of the deer tribe in a wild state.

Guano Islands.—Ichabo, Mercury, Halifax, Possession, Pomona, and Plum Pudding Islands are visited every year for guano, which is collected in considerable quantities. The season begins in April and continues until August or September, when some of the men who have been employed collecting guano go in search of seals, which frequent the rocks off this coast, while others return to the cape.

Communication is maintained between these islands and the cape by schooners which sail at stated intervals.

Winds, etc.—The winds between Capes Negro and Frio generally prevail from the southwestward, are often very strong, and create a heavy sea. Heavy squalls and gales of wind are frequent and often come on without warning and with a cloudless sky. Sometimes sand is blown from the desert in large quantities, filling the air with minute particles, which are a long time subsiding; these conditions are accompanied by intense heat.

The ordinary state of the atmosphere along this coast causes great refraction, and fogs are also frequent.

Current.—The South African Current, already alluded to in a former part of this work, is constantly setting to the northward and following the direction of the coast at the rate of 1 mile an hour.

Working to the southward.—As the general direction of the wind is from south-southwest, it is necessary for sailing vessels pro-

ceeding to any part of the coast to make the land to the southward of their destination to avoid having to work against the current when inshore. There is, however, no great difficulty in proceeding along this coast to the southward if due advantage be taken of the variations of the wind, and the tacks arranged accordingly. As a rule the wind after noon hauls round to the south-southwest, when, with a good offing, a vessel might make southing on the inshore tack until night, when the wind generally backs round to the southward, and a good board to seaward will place a vessel in a position to take advantage of the southwesterly breeze the following day.

Caution.—As the rollers frequently set in along this coast from the westward with great fury and there is almost always a tremendously heavy swell thundering upon the shores, it is advisable to give the land a good berth, except in making the harbors. This remarkable swell, which incessantly prevails from the southwestward, renders it very unpleasant for ships in calms, which often prevail during the night.

Cunene (or Nourse) River.—From the isthmus at the southern end of Tiger Peninsula to the entrance of the Cunene River, a distance of 25 miles, the coast to the southward consists entirely of sand, crowned with dark-tinted downs, which are visible from seaward at a distance of 15 or 16 miles. The Cunene River only reaches the sea in the rainy season, as during the dry season its entrance is effectually barred by a bank of sand, on which the sea breaks furiously, especially on its southern point, whence a reef has been reported to extend several miles to the westward.

Boundary.—The Cunene River forms the boundary between the Portuguese and German possessions.

Shoals.—The shore to the northward and southward of Cunene River is safe, with the exception of a small shoal patch in latitude $17^{\circ} 42' S.$ and another in latitude $17^{\circ} 50' S.$, both of which extend about $\frac{1}{2}$ mile from the shore.

Breakers.—The 5-fathom danger reported by the British naval vessel *Alecto* in 1880 in latitude $17^{\circ} 40' S.$, at about 2 miles off the coast, has probably less water on it than has been reported. A light surf was repeatedly noticed breaking upon it when passing, the weather being calm at the time with a swell from southwestward.

Between latitude $17^{\circ} 45' S.$ and Khomeb River, at the distance of 4 miles from the shore, the color of the water has been observed to frequently change suddenly from a dark bluish green to a bright green, indicating that there may be shoal patches.

In 1911 the British naval vessel *Mutine* reported a rock which breaks occasionally in latitude $17^{\circ} 51\frac{1}{2}' S.$, longitude $11^{\circ} 50' E.$ (about 5 miles off the coast); also a rock which seldom breaks in

latitude $17^{\circ} 56'$ S., longitude $11^{\circ} 52'$ E. (about $2\frac{1}{2}$ miles off the coast).

Clan Alpine Shoal.—This shoal, on which the British steam-vessel *Clan Alpine*, drawing $21\frac{1}{2}$ feet, is stated to have struck in January, 1890, is reported to lie with Cape Frio bearing 146° , distant about 26 miles. The shoal is said to be from 3 to 5 miles offshore; it presents a danger to shipping, and its position is doubtful.

On the mainland abreast this shoal there is a post, surmounted by a board, with an inscription denoting the German protectorate.

The coast.—To the northward of Cape Frio, the land is high for a distance of 18 or 21 miles, and a few miles to the northward of the cape is Angra Frio, or Frio Cove, where the shore is low and steep, and may be known by three hills, the central one being the highest.

Cape Frio is sandy and low, but has some hills behind it, according to the chart, and so continues for a distance of 45 miles to the southward, with a shore generally clean and depths varying from 13 to 18 fathoms a short distance offshore.

Breakers.—There is probably less water northwestward of Cape Frio than is marked on the chart, as the German naval vessel *Hyane* observed breakers, during a moderate southerly gale and a high sea, in a position with Cape Frio bearing 103° , distant 2 miles.

Breakers were observed about 3 miles from the coast and 8 miles 151° from False Cape Frio by the master of steamer *Windhuk* in 1907.

False Cape Frio is a point about 5 miles southward of Cape Frio fronted by sunken rocks projecting from the otherwise uniform land, and between it and Cape Frio the shore forms a bay with a semi-circular sweep about 5 miles round.

Anchorage.—In 1879 the British naval vessel *Swallow* anchored in 8 fathoms, sand and mud, about $1\frac{1}{4}$ miles northward of False Cape Frio. Vessels should use this anchorage with caution.

The coast from False Cape Frio to Swakopmund is reported to be several miles in error, both in latitude and longitude.

The general results of the *Swallow's* examination in 1879 of the coast between Cape Frio and the entrance of Walfisch Bay may be stated thus:

The coast is apparently free from danger, with the few exceptions mentioned; there are no harbors; no places at which landing may be effected in ordinary weather, and no anchorages except those of a temporary character.

Between False Cape Frio and Fort Rock Point a line of soundings was carried at $1\frac{1}{2}$ to 2 miles from the shore, the depths thus obtained being 9 to 12 fathoms; 8 to 10 fathoms are found close inshore till within a distance of 4 miles from Fort Rock Point, where foul

ground with breakers extends westward about 1 mile. The coast presents an unbroken line of surf, the flat sandy fore shore rising to hills of irregular outline, apparently of 300 to 850 feet elevation.

There is no landing between False Cape Frio and Fort Rock Point; and no trace of water, nor appearance of the country that came within sight being inhabited.

Fort Rock Point is prominent, and can not be mistaken; it is a low sandy point with a large rounded block of granite close to it, which is conspicuous for its whiteness, apparently caused by guano. This point is reported to be 10 miles northward of the position shown on the charts.

Anchorage—Landing.—Temporary anchorage may be obtained in 8 fathoms about 1 mile northwestward of the point, but there is no safe landing place at the point.

The coast from Fort Rock Point to Cape Cross is apparently free from danger, as, with the exception of Swallow Breakers, soundings of not less than 10 fathoms were found within 1 mile of the shore. Flat rocky surf-beaten coast, with sand hills of moderate elevation extending as far as the eye can reach, continues mile after mile; varied occasionally by signs of vegetation in the form of the Naras plant—a fruit-bearing creeper said to be a sign of the presence of fresh-water moisture. The entrance of the Hoanib River, 6 miles southward of Fort Rock Point, is reported not to be visible during the dry season; its mouth is therefore probably closed.

About 27 miles southward of Palgrave Point there is a break in the coast where a small stream enters the sea, the fore shore being moderately high rock.

Swallow Breakers, over which the sea breaks, extend in a westerly direction about 2 miles from the coast. When in the vicinity of this shoal ground great caution should be observed, as the lead gives little warning; and it is possible that after a continuance of fine weather the sea may not break.

Aspect.—In about latitude $20^{\circ} 14'$ south there is a perpendicular sand hill, about 500 yards long, in which, at the time of the survey, two openings, having the appearance of periodical river beds, with a sand bank extending two-thirds the distance across the mouth, inside of which was a considerable extent of rushes and reeds. Possibly this would offer a valuable highway to the interior, could a landing be effected, but of this no prospect was visible.

About 20 miles east-southeastward of Swallow Breakers is a remarkable rocky mountain inland, and a similar mountain (not charted), called the Cockscomb, to the southward.

Palgrave Point is a slight prominence of the coast from which a line of breakers extends northwestward 1,200 or 1,400 yards.

Rock.—A rock, the depth over which was not ascertained, has been discovered about 5 miles northward of Palgrave Point and about 2.5 miles offshore.

Anchorage—Landing.—There is anchorage immediately northward of the point in 10 fathoms, sand and mud, the outer breaker bearing 178° . In this berth there is a certain amount of protection from the rollers, and with a southerly wind it is considered safe, but a vessel should always be ready to put to sea on the approach of a southwest gale. There is no landing place.

Ogden Harbor is reported to be situated in latitude $21^{\circ} 3'$ south.

Ambrose Bay is a small bay situated 42 miles southward of Palgrave Point. It has a depth of about $3\frac{1}{2}$ fathoms at $\frac{1}{2}$ mile from the coast, and there are several shoals in its southern part.

Landing is difficult and the anchorage is unprotected and bad. When visited by the German naval vessel *Sperber* in 1907 no trace of human habitations could be found, and there appeared to be no water. This vessel anchored with a conspicuous cone-shaped hillock bearing 56° , distant $1\frac{1}{2}$ miles.

Beacon.—There is also a wooden beacon about $1\frac{1}{2}$ miles southward of this hillock.

Ogden Rocks, lying about $1\frac{1}{2}$ miles distant from the nearest part of the coast, break and are dangerous, and should be approached with great caution.

Cape Cross is a point projecting about 1 mile into the sea, in the form of a truncated pyramid of moderate height, being the termination of, and connected by a low sandy plain to the chain of red sandstone hills which extend into the interior in an easterly direction, and form a good mark from seaward. The cape is low and of a red color; it is difficult to distinguish, and from a distance appears like an island.

Near its extremity there is a large wooden cross, erected in the place of a former stone cross, possibly placed there by the Portuguese in the year 1486; the stone cross has been removed to Berlin.

Off the cape, a reef about 100 yards long terminates abruptly in a depth of 10 fathoms. The sea breaks heavily on the cape, and there is no landing in the bay except after a continuance of the finest weather; the best place is abreast of a red sandstone rock.

On the hill, abreast the red sandstone rock recommended as the best spot for landing, a post, surmounted by a board, with an inscription denoting the German protectorate, has been erected.

The remains of an iron vessel which had been on fire, with iron masts and bowsprit standing, were reported in 1885 to be lying well up on the shore about 9 miles northward of Cape Cross, and may be seen from some distance.

Beacon.—A wooden beacon, with topmark, 79 feet in height, has been erected on the extremity of the cape near the wooden cross. This beacon is very conspicuous.

Aspect—Landmarks.—Toward the interior, the flat sand and rocky plains continue for some miles, rising into barren hills and mountains. About 21 miles north-northeastward of Cape Cross is the highest and most conspicuous peak of the whole mountain range, running parallel with the coast, and of which the Sugar Loaf and Cockscomb, already alluded to, are prominent points. This peak, which is known to the natives as Mount Dourissa, is 3,200 feet in height, with a nearly perpendicular fall at its southern extremity, and abrupt faces to the east and west.

The hill (660 feet high) in Sierra Bay, 9 miles east-southeastward of Cape Cross, is also a good landmark for vessels coming from the southward.

Anchorage may be found in Cape Cross Bay in 7 fathoms, fine sand, with the cape bearing 205° . This anchorage, although fairly safe in moderate weather, is not a comfortable one, as the vessel lies broadside to the rollers. The best anchorage is stated to be $1\frac{1}{4}$ miles farther northward.

Buoy.—A black buoy has been placed by the Guano Co. to indicate the best landing place; it lies southeastward from the station, at the distance of 860 yards off the shore.

Trade.—There is a considerable colony of British subjects at Cape Cross, having a concession for export of guano from the Colonial Gesdschaft of Southwest Africa, and trading under the name of the Damaraland Guano Co.

The landing is generally rather difficult, and in bad weather sometimes impossible.

The coast from Cape Cross to Walfisch Bay is clear, the lead giving sufficient warning when off Farilhao Point, nor is there apparently any danger off the mouth of Swakop River.

Discolored water, however, is said to extend 15 to 20 miles from the coast between Cape Cross and Hollams Bird Islet to the southward.

Sierra Bay lies between Cape Cross and the low and sandy Sierra Point a distance of 9 miles to the southeastward; the bay runs back about 3 miles, but being exposed to westerly and southwesterly winds as well as to the almost constant swell, it is not a good anchorage, though it is sometimes frequented by whalers. At the back of Sierra Bay, 2 miles from the coast, there is a hill 660 feet in height; the sandhills at Sierra Point are low.

Farilhao Point is about 18 miles southeastward from Sierra Point; it is said to be dark and rocky, of moderate height, and sur-

mounted by a sandy down, with two volcanic rocks, the Farilhaos, about $\frac{1}{2}$ mile inland, but more recently it is described as a sand spit with shallow water off it, the rocks not being seen.

Aspect.—About 3 miles northward of Farilhao Point is the mouth of Omaruru River, and $2\frac{1}{2}$ miles farther northward the bed of a dry river, probably an arm of the same. When abreast of Farilhao Point, there will be seen to the southeastward Mount Quanwas or Colquhoun, the highest peak of the Blue Mountains; while to the eastward are two other very high and apparently isolated hills belonging to the same range.

Rock Bay.—This bay affords no shelter, although it is sometimes frequented by whalers; its southern point is about 15 miles southward of Farilhao Point.

Beacons.—There is a black tripod beacon with diamond-shaped topmark on the Schwarze Klippen Hills near the southern point of Rock Bay, and two pole leading beacons not easily distinguished in the bay itself.

Between Rock Bay and Swakopmund there are six similar tripod beacons, but having various topmarks, which, with two exceptions, are erected close to the coast.

Mount Quanwas or Colquhoun.—This remarkable mount is situated at the distance of 21 miles from the coast; it is about 2,000 feet high, with several peaks which are sharp and inclined to the northeastward, and near it is a large body of water forming a kind of a lake, about 40 feet above the level of the sea. About here the first symptoms of vegetation are seen after leaving the Cape of Good Hope, a few stunted bushes and patches being scattered around. Northward of Mount Colquhoun is a peculiar thumb-shaped mountain of about the same height.

Buoys.—A combination whistle and bell buoy is moored 3 miles 270° from the red and white beacon on Pelican Point. The buoy is painted black and white (lower half white, with "Walvis" in black letters, upper half black with No. 1 in white letters) and is surmounted by a staff with a white diamond under a white bell.

Two white conical buoys, the northern buoy with an hour glass and the southern (marked Swakop Riff) with a drum topmark, are moored 274° 1,300 yards and 231° 1,550 yards, respectively, from the lighthouse.

Telegraph buoy.—A green spherical buoy, with the letter T and a cross as topmark is moored 245° 1 mile from the lighthouse to protect the telegraph cable. Ships anchoring must keep in deeper water to northward of the line between the green buoy and the lighthouse.

Mooring buoys.—Two mooring buoys lie in 8 fathoms of water about 1 mile westward of the lighthouse and 350 yards apart in a north and south direction.

Swakop or Zwakaub River—General remarks.—The mouth of the Swakop is situated about 21 miles westward of Mount Colquhoun; the entrance is marked by thick green foliage, with rocks on the southern side, and may be known by the buildings of the German settlement of Swakopmund on its northern bank, which are conspicuous from seaward.

The route to the interior is by the Swakop, which is practicable for oxen and wagons, and runs eastward through a sandy desert, changing into plains of fine pasture when 70 miles from the seacoast, which increase in fertility farther inland. The upper portion of the Swakop passes between lofty hills of granite about 9,000 feet in height, its source being in about longitude 17° east. The radio station at Swakopmund is very conspicuous.

Depth.—The river is dry, except for one or two months in the summer, and its mouth, about 400 yards wide, is blocked by a sand bar.

Light.—A group-flashing white light, elevated 113 feet and visible 17 miles, is shown from a granite tower 92 feet high, painted white with a red horizontal band, erected 50 yards southwestward of the Government flagstaff.

Danger.—A pinnacle rock, with a depth of $4\frac{1}{2}$ fathoms over it, is situated 1 mile 239° from the lighthouse.

The anchorage is in about 6 fathoms, sand and mud, about 1,000 yards southwestward of the pierhead.

Caution.—Vessels approaching the anchorage at night, when in less than $6\frac{1}{2}$ fathoms, must avoid the lighters and tugs moored in the northern part of the anchorage, which show no lights. They must also avoid fouling the telegraph cable, which is laid 247° for a distance of 1,400 yards from the pierhead.

Piers.—The mole, about 400 yards in length, is immediately westward of the lighthouse, and has a spur near its outer end projecting to the northward for about 40 yards. This mole is entirely silted up on its southern side, and has less than 6 feet of water on the northern side and everywhere between its extremity and the shore to northwestward. The new customs pier projects about 300 yards from the beach at a point about 800 yards to southward of the old molehead, and has soundings of 2 and $2\frac{1}{4}$ fathoms at its extremity.

The iron pier is about 400 yards long.

Landing is generally rather difficult, and in bad weather sometimes impossible. Kroomen are employed for working surfboats.

Signals used in landing and shipping cargo.—The following signals are hoisted at flagstaff on jetty:

N—Discharge into lighters.

K—Only large boats can be used.

M—Lunch interval.

J. G. J—Cease discharging cargo.

J. E. S—Commence again.

F. Q—Entrance dangerous.

F. R—Bar impassable.

B and two blasts by }
siren----- } Launch required at bridge.

N. C. and several }
blasts----- } Craft near shore in danger. Tug required at
once.

The following signals are made from steamers:

B—Lighter full. Tug required.

R. A. or four long }
blasts by siren---- } Lighter or boat drifting .

The following are made from landing stage in fogs:

One long blast re- }
peated at intervals } Sea smooth, boats working at jetty.

Two long blasts with }
short intervals --- } Entrance dangerous.

Three long blasts }
with short inter- }
vals----- } Sea too rough for work.

Tides.—It is high water, full and change, at 3 h. 20 m.

Hospital.—A lazaretto has been established at Swakopmund, also at Oritjo and Keetmanshoop.

Communication.—Before the outbreak of the European war the Woermann Line maintained a service of two cargo steamers per month between Hamburg, Swakopmund, and Luderitz Bay, and ran one cargo steamer, which took passengers, every three weeks between local ports and Cape Town.

The steamers of the Deutsche Ost Afrika Line called for passengers and mails only, every fortnight, both outwards and homewards.

The Elder Dempster Line ran a steamer once every two months direct from New York to Swakopmund for cargo only.

Railway.—The line through Windhoek is now completed, and open to Keetmanshoop, thus connecting with the line from Luderitz Bay through Seeheim, and running to Kalfontein to the southward. There is a railway to Tsumeb and Grootfontein via Otawi, a distance of 359 miles.

Telegraph.—A telegraph connects Swakopmund, Karibib, Okahandja, and Windhoek, and there is a telephone system in connection with it. There is a land line to the Union of South Africa via Warmbad-Steinkopf.

A cable connects Swakopmund with Cape Town and Mossamedes. This cable is laid 247° for a distance of 1,400 yards from the pierhead, and then 175° . An overland wire to Cape Town is being constructed.

Radio.—A radio station has been established at Swakopmund, in latitude $22^{\circ} 41' 07''$ S., longitude $14^{\circ} 31' 29''$ E. It is open to the public from 9 a. m. to noon, from 3 p. m. to 6 p. m., and from 9 p. m. to midnight. Call letters K. A. K.

Town.—The town is well laid out, and lighted by electricity. The streets are of sand, but flanked with wooden sidewalks. Traffic through the streets is carried on by means of vehicles running on rails. A plentiful supply of water is obtained from the Swakop River. The population, by census of 1912, was 3,662 persons, of whom 1,394 were white.

Trade.—Swakopmund has become the port of call and chief seat of the export trade of German Southwest Africa.

Boundary.—A German flagstaff and notice board beacon stand near the northern bank of the Swakop, and British beacons near the southern bank; the boundary line is midway between, in the bed of the river.

Shoal.—About 2 miles southward of Swakopmund a shoal extends about 800 yards from the coast.

Caution Reef is to the southward of a point 4 miles southward of Swakop River entrance. It extends about 1 mile from the coast and 3 miles along it.

Beacon.—There is a black tripod beacon with spherical topmark on the above-mentioned point.

Walfisch Bay, the entrance to which is situated about 12 miles southward of the Swakop River, is formed by a bold curve in the coast line and the sandy Walfisch Peninsula. It is 6 miles wide at the entrance and $4\frac{1}{2}$ miles to its head and throughout affords sheltered anchorage in a convenient depth, being open only to the northward. The 10-fathom line stretches across the mouth of the bay from the end of the peninsula in an easterly direction to the mainland, and the soundings decrease gradually to 6 fathoms, which depth continues almost the whole way across the center of the bay, lessening thence in all directions toward the land.

The country between the Swakop River and the head of Walfisch Bay, with the exception of a narrow strip along the coast, is covered with sand hills 300 to 350 feet in height. The sand hills near the shore on the east side of the bay, 10 to 100 feet high, are sparsely covered with creepers and stunted bushes. A large tract of country inland of these hills is partly under water when the Kuisip River is in flood.

Bird Rock.—On the eastern shore of Walfisch Bay, at its entrance, nearly abreast of Pelican Point, is Bird Rock, situated close-in

within the 3-fathom line. It is of granite formation, 280 yards across, flat, and covered with shellfish and seaweed. It dries 4 feet at low water.

The coast abreast of Bird Rock has a bed of granite with a large accumulation of seaweed at the high-water line which gives that part a dark color and a rocky appearance.

Beacon.—A rectangular beacon, 28 feet high, and painted in red and white horizontal bands alternately, elevated 54 feet above high water, stands on the coast about 2,280 yards southward of the center of Bird Rocks.

Landmark.—A chimney, 115 feet high, painted black with a white band 24 feet deep 22 feet from the top, stands at the condenser on the following bearings: Church spire 51° and white beacon 255° .

Pelican Point, on the western side of the entrance to Walfisch Bay, is the northern extremity of Walfisch Peninsula, which, composed purely of sand, juts out 5 miles in a northerly direction, with a width of from $\frac{1}{2}$ to 1 mile and a general height above the sea of 2 to 4 feet. Here and there are a few dunes 8 to 11 feet high, which are constantly changing in shape and position through the strong south-southwest winds.

Light.—A 1,000 candlepower unwatched flashing white light is shown at Pelican Point.

Beacons.—A beacon stands 1,200 yards southwestward from the extremity of Pelican Point to serve as a guide to vessels rounding the point; it is pyramidal in shape, painted with alternate horizontal red and white bands, and is surmounted by a white ball elevated 41 feet above the ground.

There are also numerous beacons for special purposes erected on Walfisch Peninsula, for which see chart. These beacons are not permanent and must not be considered as marks for navigation.

Mud island formed by submarine disturbance.—On June 1, 1900, a mud or clay island, 150 feet long, 30 feet wide, and 12 feet above high water, was formed off the northeastern corner of Pelican Point by volcanic action at the distance of about 100 yards from the shore. Depths of 7 to 10 fathoms were obtained all round this island and between it and Pelican Spit. Steam was observed rising from the clay composing the island. Within three months of the date of the upheaval this island disappeared.

Light.—A fixed white light, elevated about 25 feet and visible about 8 miles, is exhibited from a beacon at the settlement in Walfisch Bay.

Beacon.—A white rectangular beacon, 30 feet in height, and similar in shape to the beacon on Pelican Point, stands on the western side of the entrance to the lagoon at the head of the bay, 2,050 yards westward of the settlement church spire.

Shoal.—A shoal, with a depth of $4\frac{1}{2}$ fathoms of water, is situated at a distance of 1,550 yards 80° from the red and white beacon on Pelican Spit. It is about 300 yards in length and 200 yards in width.

Directions.—As the depths off Pelican Point are constantly altering and shoals may form off it, this point should be given a berth of at least 1 mile. In other respects there is no difficulty in entering Walfisch Bay.

Anchorage suitable for large ships can be obtained in 5 fathoms, mud and shell, with the church spire bearing 177° distant 2 miles; and for small vessels in 3 fathoms, with the church 135° 1 mile. There is also good anchorage in 5 fathoms, mud, about 1,600 yards from Observation Spot, with the point bearing between 213° and 281° .

Kuisip River, in its course through the territory, passes Ururas, Rooibank, and Zandfontein, finally discharging in the bottom of Walfisch Bay. The water of this river reaches the sea always, but as for the last 60 miles of its course it has 30 feet and upward of sand in its bed, it is only in years of exceptional rainfall in the interior that it saturates the whole of this sand and becomes a running river at its surface. The dates of late years when it ran into the sea are 1856, 1864, 1881, 1885, 1891, and for a week in 1893. Flood time is about February or March. The bed of the river in places exceeds 1 mile in width, but a new course is formed each time it runs. There is a considerable amount of vegetation, most of which is, however, useless for grazing cattle.

The settlement at Walfisch Bay consists of the Government buildings, mission house, church, and about a dozen houses or factories. Being but little above the level of the sea, some of these are nearly surrounded by water during spring tides, especially when the Kuisip River is in flood. There is a resident magistrate here, and a township has been marked out.

In 1913 the population consisted of 28 whites and about 650 colored people.

The Walfisch Bay Whaling Co. has erected a factory about $1\frac{3}{4}$ miles northeastward of the settlement.

The Durban Whaling Co. has a floating factory and a hulk.

In 1912 there were 11 cutters in the snock fishing industry. They took 347 tons of fish.

There is one tug and there are three 25-ton lighters.

Pier.—A wooden pier has been constructed at the settlement, near the church, which extends out 625 feet into a depth of 10 feet at low water springs. There is a crane on it capable of lifting a weight of three tons.

Light.—A small white light is shown at the pier end.

Coal.—There are facilities for coaling. About 60 tons of slack or patent fuel are kept in stock.

Water.—The natural ordinary supply of water is very limited and brackish, and drinking water for the Europeans has been brought here from the cape. The settlement is now furnished with a condensing machine able to make 500 gallons of fresh water in 8 hours; it is reported to be strongly tainted with a fishy flavor, but not unwholesome; this water is not sold except in limited quantities on an emergency.

Supplies.—The supply of meat can not be relied on. Vegetables are scarce and expensive. Bread is unobtainable. Fish is very plentiful, and can be caught with the seine; there is a great variety of a good sort. Wild duck may be found, but are scarce in the immediate neighborhood.

The natives in the Walfisch territory subsist chiefly on the fruit of the Nara bush, which resembles a custard apple, and is very nourishing.

Communication.—Union Castle, Clan, and German steamers call at the bay. A coasting steamer runs to and from Cape Town every four weeks. General telegraphic connection with the universal system can be had at Swakopmund, which is distant about three hours' journey for a horseman.

Climate.—The climate of Walfisch Bay is generally healthful, and there is no malaria. For its position the place is comparatively cool while the southwest wind is blowing, but it is hot in clear, still weather. Sudden changes of temperature are very common. The nights are usually damp and chilly, heavy dews and thick fogs being prevalent then, and often extending well into the forenoon. From 10 a. m. to 2 p. m. it is generally fairly clear, but on the southwest breeze freshening it becomes quite misty. The mirage here is very great, and objects are much distorted by refraction. In July, with no wind in the harbor, a fall of sand has been experienced, probably the result of an easterly gale in the adjoining desert.

Tides.—It is high water, full and change, at Walfisch Bay at 3 h. 20 m.; springs rise $5\frac{1}{2}$ feet, neaps $3\frac{3}{4}$ feet.

Boundary.—The width of the strip of British territory is about 14 miles to southward of the settlement and about 7 miles to northward of it.

Port D'Ilheo, or Sandwich Harbor, lies about 27 miles southward from Pelican Point, the intervening coast being low and sandy, with a slight convexity projecting 2 miles to the westward of the above direct line. The port is formed by a low, sandy peninsula on its western side, terminating in D'Ilheo Point, on which there is a 16-foot black beacon with triangular topmark; the point is nearly level with the sea and has shoal water extending more than 1 mile

shape, or like a rudely formed letter T. Northward of these the coast apparently curves considerably to the westward and becomes much lower, rendering it difficult to distinguish on account of the heavy surf and spray which envelops it.

Bank.—A bank with a depth of 27 fathoms was reported by the steamer *Titania* in 1904 to exist about 105 miles westward from Flat Topped Rock.

Sylvia Hill, situated about 13 miles southward of Flat Topped Rock, is a conspicuous, sharp, double-peaked hill, which stands closely over a rounded point; when seen from the northward Sylvia Hill is not so conspicuous as it appears from the southward, but being higher than the surrounding land it will attract attention.

Shoal water appears to extend nearly 2 miles from the coast under Sylvia Hill.

Easter Cliffs, situated about 12 miles southward of Sylvia Hill, are high and rugged sand cliffs extending about 3 miles, the intervening coast being sandy and forming two slight indentations, behind which there rises a monotonous range of hills.

Breakers extend off the coast immediately north of Easter Cliffs for some distance from the shore, although no projecting point could be distinguished. The coast about here should not be approached nearer than $2\frac{1}{2}$ miles, the soundings at this distance from the shore being 15 and 16 fathoms, even bottom.

The coast.—Southward of Easter Cliffs the coast is sandy for about 5 miles, forming a slight indentation, and terminating in a rocky point which is not conspicuous, but 2 miles southward of which are several small sand cliffs. Southward of this point the coast forms a bay 8 miles across, which recedes $2\frac{1}{2}$ miles to its head, to the northern point of Spencer Bay.

The intervening range of coast hills forms an unbroken and somewhat high and level range of sand hills, about which there is no mark by which one may be distinguished from another.

Spencer Bay is a considerable indentation in the coast, about 66 miles southward of Hollams Bird Islet, and may be known by Mercury Island, which lies off the middle of the bay.

North Point is high and sandy, with high, bold land 3 miles in extent to the northward of it.

Dolphin Head, the southwestern point of Spencer Bay, is of most remarkable formation, being high, steep, and rocky, rising almost perpendicularly from the sea to a height of 600 feet. When seen from a few miles northward of Spencer Bay, Dolphin Head appears like an island and bears a slight resemblance to the Rock of Gibraltar.

The above points form the most remarkable land along this coast.

The bay.—From Dolphin Head the North Point lies north-northeastward about 4 miles, and this line just touches the inner end of

Mercury Island, within which the coastline of the bay falls back about 2 miles.

Mercury Island, which appears as a sharp white pyramid, is a bleak, rugged rock, of an oblong shape, 130 feet high, $\frac{1}{4}$ mile in length, north and south, with a detached rock 50 feet high off its northern end, which is steep-to; but off the southern end of the island a rocky shoal runs off about 400 yards. The sea at times beats against the shores of the island with indescribable fury, and rushes into an immense cavern 84 feet high through several apertures or rents, causing thereby an awful noise and commotion.

Mercury Island is composed of bare rock, very steep, and even precipitous in places, while the guano renders the foothold often precarious, not to say dangerous, unless care be taken. Whales frequent the bay during the months of July and August.

Danger.—The sea has been seen to break heavily in bad weather over the bottom rather more than $\frac{1}{2}$ mile northeastward of Mercury Island, but there is a considerable depth of water in this position, and the sea only breaks in a very heavy swell.

Landing.—During the guano season (April-August), when men are living on Mercury Island, landing may be effected with comparative ease even in moderately bad weather, but at other seasons it would probably be attended with much difficulty. The landing place is just south of a narrow gully which separates the main part of the island from the islet off its northern extremity. The only danger to avoid is a round-topped rock which sometimes uncovers with the swell, and which lies close to the spot which a stranger would make for as being the best to run alongside of. The boat should run close northward of this rock, letting go an anchor offshore.

Directions—Anchorage.—Vessels can enter Spencer Bay on either side of Mercury Island, but if using the southern passage care should be taken to avoid the shoal reef off the southern end of the island. The best anchorage is on the eastern side of the island, about 800 or 1,000 yards from the island shore, in 6 fathoms water, sand and clay. Vessels loading guano lie a little over 400 yards from the island coast. It is not advisable for ships to anchor on the southern side of the bay, as it is seldom free from a rolling swell, and a heavy westerly swell heaves into it at the full and change of the moon, while vessels anchored under the lee of Mercury Island are in comparatively smooth water.

The winds are either fresh from southward or are light northerly winds with fog; the latter never blow with violence, otherwise this would be a dangerous bay to lie in. With south-southwest winds it is well sheltered by the southwestern point, which is very high, though the wind sometimes blows over it in violent gales.

In bad weather the sea breaks over the beach for a considerable distance, and forms several lagoons in little hollows behind it, which are frequented by numerous flamingoes and other birds.

Guano.—The average quantity of guano obtained at Spencer Bay annually is 350 to 450 tons, the chief birds being shag and penguin, whereas on Ichabo Island the birds are nearly all a kind of gannet, locally known as Madagars.

Country.—The interior of the country abounds in cattle, sheep, deer, bucks, wolves, gray foxes, elephants, and ostriches in greater numbers than it does farther southward. There are many salt springs in the valleys at the head of Spencer Bay, where salt might be manufactured in immense quantities.

Coast.—Rugged cliffs extend $2\frac{1}{2}$ miles southward of Dolphin Head, thence a bay of sand and cliffs 2 miles across, at the northern end of which is a rocky pyramid when seen from the southward, but flat topped from the westward; the southern point of this bay is a rather conspicuous bold headland; from thence the coast to the southward is a low sandy bay until within 1 mile of Saddle Hill, when it becomes bold.

Saddle Hill.—At 12 miles southward of Dolphin Head there is a conspicuous sharp-peaked Saddle Hill, which stands immediately over the shore, and may be easily observed in clear weather from Ichabo Island. Saddle Hill, when seen from the northward, has apparently but one peak, and is only distinguishable as being the highest land in the locality.

The coast between Saddle Hill and Hottentot Bay is a sandy beach, rising at a short distance inland to a level range of sand hills.

This beach is continuous except in two places, where there are small sandy cliffs close to the water.

Hottentot Bay.—This bay, situated about 24 miles southward of Spencer Bay, is about 3 miles broad, between Hottentot Point and the mainland, and from this line the bay runs back to the southward upward of 1 mile and affords secure anchorage in from 6 to 4 fathoms, with good holding ground of sand and mud southeastward of the point.

Natives occasionally visit the bay for fishing, and sometimes ostrich feathers may be obtained in exchange for tobacco. Though generally armed with bows and arrows, they seem civil and harmless. There is abundance of fish, but no water.

Hottentot Point is the point of land protecting the bay, and appears as a succession of sand hills of about the same height, and is partly rocky and bold, but near the mainland the neck of the peninsula is low and sandy, so that Ichabo Island may be seen over it from the masthead of a small vessel at anchor.

When coming from the southward this peninsula makes like two low, bare, gray, isolated rocks, of which the northern one is a little the higher.

Beacon.—A beacon, 41 feet high, has been erected on the Hottentot Peninsula.

Islet.—Outside the bay, on the southern side of the neck, distant about $1\frac{1}{2}$ miles, is a small rocky islet, and here during the laying and incubation season numerous birds resort, and a large quantity of eggs may be obtained. Seals also may sometimes be caught.

Gallovidia Reef.—The islet is connected with the shore by Gallovidia Reef, several parts of which are awash and others above water; it projects in a southerly and westerly direction from the peninsula forming Hottentot Bay, and lies nearly in the direct course from that bay to Ichabo. Care should be taken not to pass within the depth of 9 fathoms, as it has been seen to break heavily in 8 fathoms.

Wreck.—The wreck of a large steamer, with mast and funnel standing, lies on the above reef (1909).

The coast.—The trend of the coast between Hottentot Bay and Ichabo Island is southerly, its general character being rocky, with occasional sandy beaches. Some points marked with rocks are prolonged into the sea by reefs, which in some places extend 1 mile off-shore.

Danger Point is about 9 miles southward of Hottentot Point; it is bold, and has shoals and breakers extending 600 yards to the northward from it.

Ichabo Island, about 30 feet high, said to be composed of granite, slate, stone, and quartz, is lozenge-shaped, 600 yards long, and 200 yards broad, and is distant 1,400 yards from the nearest part of the mainland. There is a settlement and a flagstaff at the northern extremity of the island and a spar beacon on the highest part toward the southwestern side. Ichabo can be seen from a considerable distance on account of its whitish appearance.

There are several offlying rocks, which, so far as is known, are above water, excepting a patch of sunken dangers extending about 200 yards off the northern point of the island.

The 5-fathom line surrounds the island at a distance of 600 yards from the beacon; it is dangerous to go inside this line.

Wreck Point is 1,400 yards eastward of the island; 1,000 yards northward of the point is a shoal with less than 6 feet over it. In the finest weather landing may be effected at this point.

Douglas Point is about 1 mile to the southward; it forms the protection for landing in Douglas Bay, where there is a village.

Rocky Point is the southern point of the bay opposite Ichabo.

Directions.--As the prevailing wind is from south-southwestward, the land should be made southward of the island, and if standing in between the parallels of latitude $26^{\circ} 15'$ south and $26^{\circ} 25'$ south the mountains inland should be made out and steered for on a 110° bearing, when there will be no difficulty in making Ichabo, which can be seen at a considerable distance on account of its whitish-yellow color.

Vessels can pass to the northward or southward of Ichabo Island, giving it a berth of 800 yards at least, but the latter is preferable, as the passage northward of the island is said to break in bad weather and is narrower.

Anchorage.—This can hardly be considered more than a fairly good anchorage, the holding ground being composed of sandy patches among rocks. Vessels are well sheltered by Ichabo Island from the heavy swell which sets in, but northeastward of the island the rollers are often dangerously heavy.

Vessels can anchor in $5\frac{1}{2}$ fathoms about 600 yards eastward of the settlement, or in about the same depth 1,000 yards southward of it. There is also another anchorage in 7 fathoms northward of Douglas Bay.

Tides.—It is high water, full and change, at Ichabo Island at 2 h. 30 m.; springs rise 7 feet, neaps 4 feet. The tidal stream is imperceptible, but usually a northerly current sets through the anchorage at the rate of 1 mile an hour.

Landing.—Landing to a stranger will often appear difficult; the best place is on the northeastern extremity of the island, where a patch of kelp will be seen which materially assists in hauling up a boat on the shelving rocky shore.

Trade.—Until 1843 Ichabo Island was scarcely known, but in that year an immense deposit of guano was discovered here, and a large number of vessels at once came to load with it; the export of guano is about 1,600 tons yearly. There are no seals on the island, though natives bring skins from the mainland and surrounding islands. There are white men and natives on the island, employed in collecting the guano; the place is visited about every six weeks or two months by a schooner.

Fish may be caught at the anchorage with hook and line, or at the head of the bay with a seine, in great quantities; crayfish abound all round the island near the shore.

There are four large boats and a small punt at Ichabo, and the landing is fairly easy in the punt.

This island is the most valuable of various guano islands owned and worked by the Government of the Union of South Africa. The island was covered with gannets, being literally a mass of birds, and the air and water seemed alive with them in every direction; in fact,

the only open space was round the guano men's house, at the north end of the island.

The population consisted of a few men, five women, and some children. Nearly 2,000 tons of guano are shipped yearly from the island, and 30 men are employed during April and May, when all the gannets depart. After the birds have been away for two months they suddenly reappear in one immense flight, which is said to last only one hour.

All provisions, including water, are brought by steamer from Cape Town once every three months.

Village.—There is a Hottentot village of some size on the beach of Douglas Bay. The water used by the natives is procured from about 8 miles inland, while that used by the Europeans is brought from Table Bay, Cape of Good Hope.

Winds.—Northerly winds accompanied by fog are frequently experienced, but northwest gales are of rare occurrence. The breeze is often strong from the southwest; no rain falls, but dense fogs and heavy dews prevail, and occasionally there is lightning and thunder. The dryness of the air is so great as to produce disagreeable effects on the face, mouth, and eyes.

Rollers.—The rollers come in without giving previous warning, and it is no unusual occurrence for both entrances to break right across, leaving comparatively smooth water at the anchorage.

Marshall Rocks.—The mainland to the southward of Ichabo is fronted by extensive and dangerous reefs, many parts of which, being under water, are not observable when the sea is smooth; at the distance of 4 miles southward of the island the breakers about the Marshall Rocks extend $1\frac{1}{2}$ miles from the shore. There is a deep-water channel inside these rocks, which, however, should be carefully avoided.

Staple Reef, which probably joins Marshall Rocks, consists of an extensive area of sand banks and rocks, with patches of comparatively deep water between them.

Staple Rock.—Staple Rock is low and black, lying on the eastern end of Staple Reef $\frac{3}{4}$ mile from the coast, at about 4 miles east-southeastward of Marshall Rocks. It is often covered with seals and is visited every year by a sealing expedition from the several guano islands.

Rollers—Caution.—Although the above dangers may be passed at a distance of less than 1 mile, yet the rollers extend much farther than that, and the water is often seen to break in 10 and even 12 fathoms.

From the northern extremity of Staple Reef, rollers extend in a northerly direction, more or less parallel to the coast, to the Marshall

Rocks, and although a vessel approaching from the southward might possibly come safely along the shore inside of them, between Staple Rock and the shore, where there is a passage through which vessels have passed to the entrance of Ichabo, it is highly dangerous, and ought not to be attempted, except from urgent necessity.

Clearing marks.—The conical sand hill in line with a high rounded hill inland, bearing 98° , leads southward of Staple Rock in 9 to 10 fathoms water, which depth, however, is too shoal in some circumstances which may arise on this coast; and to keep clear of the rollers a vessel should keep the high rounded hill well open to the southward of the conical sand hill.

Conical Hill is a conspicuous cone of sand, which stands out clearly when seen in the afternoon. There are two or three rocks about $\frac{1}{2}$ mile from the coast at its base.

Boat Bay, about 3 miles to the southward of Conical Hill, is a snug anchorage during the prevalence of southerly winds, and open only to the northward and northwestward; the ground is clear of all dangers, with a depth of 4 to 6 fathoms.

Dumfudgeon Rocks are two small islets, $2\frac{1}{2}$ miles southward of the southern point of Boat Bay. Dagger Rock is a small rock 200 yards from the coast $2\frac{1}{2}$ miles farther to the southward.

Luderitz Bay (Angra Pequena).—This bay, which is about 22 miles southward of Ichabo, is comprised between Northeast Point to the eastward and Diaz Point to the westward, distant $4\frac{1}{2}$ miles 227° from the former, and within these boundaries there are several good anchorages easy of access.

Little Orange River falls into Luderitz Bay, but its mouth is not shown on the plan.

Diaz Point is the western point of this bay, named after the celebrated Portuguese navigator, who visited the place in 1486 and placed on it a marble cross. The point is rocky and has deep water close to its northern extremity.

Light.—A flashing white light is shown 174 feet above high water from a gray tower located 600 yards inside the extremity of Diaz Point. It is visible 19 miles. For details and sectors see Light List.

Fogsignal.—At a distance of 520 yards 286° from the lighthouse a fog trumpet is sounded in foggy weather.

Signal mast.—A signal mast, 68 feet high, has been erected on Diaz Point.

Beacon.—On Diaz Point a large cross has been placed as a beacon on the site of the marble cross erected by Bartholomew Diaz in 1486.

Northeast Point is bold and rocky. North Reef extends from it for 600 yards in a westerly direction.

Islands.—From Northeast Point, three islands, viz, Seal, Penguin, and Shark, extend in a southerly direction.

Seal Island, 144 feet high, is 1,400 yards in length and of a dark color, and is round-topped, with the northern extremity sloping more gradually to the sea than the southern.

Southward of Seal Island is Penguin Island. The actual channel between the islands, with a depth of from 5 to 7 fathoms, is narrowed to 400 yards by shoal tongues extending from the extremity of each island.

Penguin Island is long, 164 feet high, and rocky, its northern extremity is apparently covered with guano or whitish yellow-colored sand. In the middle of the island there is another patch of similar appearance. The patches are conspicuous in the afternoon. A reef extends 200 yards from the southern point of the island.

Shark (Haifisch) Island, 144 feet high, the southernmost, all but joins the main shore at its southern point. Off its northern point a reef extends about 200 yards, on which is a rock, awash at low water, 180 yards from the point.

Light.—A fixed light, elevated 130 feet, showing white, red, and green sectors, visible 16 miles, is shown from a white square tower, 11 feet high, situated 600 yards within the northern point. For sectors see Light List.

Angra Point, 1.4 miles westward of the northern point of Shark Island, is about 131 feet high and projects boldly into the bay in a northerly direction.

Angra Rock, which is always above water, is 600 yards northward of the point. Between the rock and the point is a patch of $3\frac{1}{4}$ fathoms, which breaks.

Whistlebuoy.—A whistlebuoy, painted white, marked "Angra Riff N.," with two vertical triangles points upward as a topmark, is moored in 8 fathoms 1,200 yards northward of the point.

North Harbor has an entrance 600 yards wide between the northern end of Seal Island and Flamingo Island and depths of from 3 to 4 fathoms in it. Seal Island is joined to the mainland by a shoal bank with the least depth of $2\frac{1}{4}$ fathoms over it, on which vessels of light draft might anchor with advantage.

Tiger Rock, awash at low water, lies nearly midway between the northern end of Penguin Island and the mainland and obstructs the northern entrance to Robert Harbor. To the southward of it a shoal bank of 3 fathoms connects Penguin Island with the coast.

Buoy.—A white spar buoy, marked "Tigeriff," with red topmark of two triangles, bases together, is moored on the northeastern side of the rock.

Robert Harbor is a good and well-sheltered anchorage about 1,000 yards broad, between Penguin and Shark Islands and the

mainland, and has good holding ground of clay in from $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms. It is proposed to dredge the harbor and lay down moorings. The entrance, between Penguin and Shark Islands, is 600 yards wide and has a depth of $4\frac{1}{2}$ fathoms in it. The southern part of the harbor, between Shark Island and the mainland, is known as Menai Creek.

Buoys.—The entrance is marked by a black spar buoy on the northern side and a red spar buoy on the southern side. There is also a black conical buoy about 200 yards southwestward of the southern point of Penguin Island.

Nautilus Hill, 433 feet high, overlooks Robert Harbor, and appears to be the highest land in this locality.

Angra Bay.—Between Shark Island and Angra Point is an inlet to which the name of Angra Pequena is properly supposed to apply. the entrance to which is 1 mile broad. The inlet runs back southward for a distance of $3\frac{1}{2}$ miles, but not more than half that distance is available as an anchorage. The southern part of the inlet is known as Boshman Creek. Else Beacon stands at its head on the eastern shore. Off Shark Island there is excellent anchorage in about $3\frac{3}{4}$ fathoms about 1,000 yards northwestward of Luderitzort, the settlement.

Buoy.—There is a red conical buoy in 3 fathoms, 1,000 yards, westward of the settlement.

Shearwater (Sturmvogel) Bay, between Angra and Diaz Points, is about 2 miles across and 1 mile to its head. Anchorage according to draft can be obtained on a sandy bottom, with good shelter from all except north and northwestern winds. There are two landing places here. A whaling company is erecting a land station in Shearwater Bay.

Directions.—Steamers will experience no difficulties in entering Luderitz Bay. If from the northward, steer to pass to the northward of Angra Riff whistlebuoy; if from the southward, Diaz Point can be rounded at a distance of 600 or 800 yards, and pass to the northward of the Angra Riff whistlebuoy. Vessels should not pass between this buoy and the point. At night, vessels should keep in the white sector of Diaz Point Light until the white sector of Shark Island Lighthouse appears, when the whistlebuoy will have been passed. From the whistlebuoy course can be steered to pass between black buoy and red buoy marking the entrance to Robert Harbor, or for the red conical buoy in the anchorage in Angra Bay.

Sailing vessels will probably have to beat in, and in tacking must be guided by the chart and the weather conditions prevailing at the time.

Pilots.—Pilotage is compulsory for all but Government vessels, and certain regular traders. The pilot signal must be made by the

international code, and vessels must wait in the vicinity of the Angra Riff Whistlebuoy. The vessel's berth will be assigned by the pilot.

Anchorage.—The anchorage in Robert Harbor is in about 4 fathoms, with smooth water, and well protected at all seasons. Angra Bay offers excellent anchorage in $3\frac{3}{4}$ fathoms, as already described. It is preferable to that in Shearwater Bay, in consequence of the violent gusts and squalls felt in the latter. North Harbor has fair anchorage in $3\frac{3}{4}$ fathoms, but it is better for vessels of light draft to anchor farther to the southward, under Seal Island. In some parts of the bay the bottom is reported to be a layer of ooze, 10 to 13 feet thick, over rock, making the holding insecure.

Southerly winds blow very hard at times, and are succeeded by calm intervals, when a heavy swell sets into the bay.

Signals used in landing and shipping cargo.—The following signals are made from steamers in Luderitz Harbor:

B—Lighter full; tug required.

R A—or four long blasts by siren—Lighter or boat drifting.

F—Landing officer wanted.

Tides.—It is high water, full and change, at 2 h. 28 m.; springs rise $6\frac{1}{2}$ feet.

Pier.—There is a small pier in Robert Harbor.

Luderitzort.—Luderitzort is the settlement, and is situated on the point southward of Shark Island between Menai Creek and Angra Bay; it contains several hotels, a banking house, besides railway and military workshops. There are three steam tugs, steamboats and lighters of various capacities, and steam water-tank surfboat, horse floats, and a dredger. The commerce is considerably improving. The diamond fields in the neighborhood of Luderitz produced in 1909 stones valued at \$3,500,000.

Luderitzort.—The town is lighted by electricity. Tram rails have been laid through the streets to facilitate traffic, the vehicles being horse drawn.

Piers.—There are three wooden piers in the bay northward of the settlement; the principal pier is 300 feet long by 25 feet wide; it has three steam 5-ton cranes on it.

In 1911 the Government was building a short wooden landing stage on the beach below the old cemetery, about 2 miles northeastward of the town, to facilitate the loading of sailing ships, which can load there in any kind of weather.

Population.—The population (1912) consists of about 1,676 white persons, with a total of 6,358. It is composed of Germans, British, Boers, and Jews, the German language being generally in use.

At the distance of about 7 miles inland a belt of shifting sand about 20 miles in width separates the settlement from the cultivated lands in the interior. This sand desert is a great hindrance to trade,

and it occupies from five to seven days to make the journey by bullock wagons from the settlement to the trading posts.

Communication.—The steamers of three companies run every three weeks to Cape Town.

Radio.—A radio station has been established at Luderitz Bay. It is open to the public from 9 a. m. to noon and from 3 to 6 p. m., except on Sundays, when it is only open from 4 to 6 p. m. Call letters K.C.U.

Railway.—A railway from Luderitz Bay extends into the interior to Seeheim, where it branches off to Keetmanshoop to the eastward and Kalkfontein to the southward.

Climate.—The climate of Luderitz Bay may be considered good. The temperature has not been registered above 75°. A fresh south or southwest wind is generally blowing, and there is a cool northerly coast current; inconvenience is caused by the fine sand, which fills the air with offshore winds.

Supplies.—No fresh provisions are procurable, but there is a fishery establishment, where fish is cured and sent to Cape Town.

Coal.—About 200 tons of coal is usually kept in stock for condensing purposes, and for the use of German gunboats calling; 50 tons, at about \$11 per ton, can generally be procured.

Harbor regulations.—The harbor limits have been defined and regulations issued. Detailed information respecting them must be obtained on the spot. A harbor office under a district board has been established. Mariners must obey all orders emanating from the office. Ashes and any other refuse are not allowed to be thrown overboard. Loss of anchors or ground tackle is to be reported immediately to the harbor office. Fishing is forbidden from the shore, but it may be carried on within the harbor limits with permission. An hour's notice is required before landing powder or other combustibles. Contravention of the harbor regulations is punishable by fine.

Water.—The great disadvantage to Luderitz is the absence of fresh water. None can be found either in the settlement or its environs. The condenser on which the water supply of the town depended broke down in 1911. At present the water used for household purposes is brought down 60 miles by rail from Garup.

Guano Bay is an anchorage situated immediately westward of Shearwater Bay; the entrance is about 1,600 yards across between Halifax Reef and the cross beacon on Diaz Point. The bay is sheltered from southerly and southwesterly winds, but open to the northward.

Halifax Island, on the western side of the bay, is 128 feet high, and has a flagstaff and huts on it. This island appears from the

southward like a range of black hummocks, and has been mistaken for Diaz Point. The island is separated from the mainland by a narrow channel.

The anchorage is in about 6 fathoms 600 yards northeastward of Halifax Island flagstaff; within this distance the depth decreases rapidly.

Halifax Reef extends 1,000 yards in a northerly direction from the island.

Big Bay lies about 6 miles southward of Halifax Island, the coast between being rocky; it is $1\frac{1}{2}$ miles across, about $\frac{3}{4}$ mile to its head, with a sandy coastline; it affords no shelter, and the bottom within it is foul.

Albatross Peak, elevated 597 feet, is about 8 miles southward of Diaz Point. It is a double-headed hill, reddish in color, and a good mark from the southward.

Wolf (Adventure) Bay.—For 3 miles southward of Big Bay, the coast is rocky to Wolf, or Adventure, Bay, the entrance to which is about 1,000 yards broad. The bay extends about 800 yards in a northerly direction; its shores are sandy, but it is exposed to the southwestward and offers no protection. There is, however, a landing place on a small sandy beach at the head of the bay.

North Long Island is on the southern side of the entrance to the above-named bay. It is a low, level island about 1,000 yards long, almost divided into two parts.

The channel between the island and the mainland is about $\frac{1}{4}$ mile wide.

Beacon.—Abreast the island, on the mainland, is a conspicuous pyramidal cairn, visible 7 miles, and useful in indicating the position of Long Island, which, being low and close inshore, is very difficult to make out from the offing.

South Long Island is about $\frac{1}{2}$ mile southward of North Long Island, and about 300 yards off a small point projecting from the coast.

The coast.—From South Long Island the coast trends in a southerly direction for a distance of $4\frac{1}{2}$ miles, and then southeastward $2\frac{1}{2}$ miles to Elizabeth Point. This coast is much indented, rocks extend off it in many places, and the surf heavy; it is slightly vegetated.

Reef.—There is a submerged reef 800 yards from the shore, 3 miles southward of South Long Island.

Elizabeth Point lies $6\frac{1}{2}$ miles southward of South Long Island, and is low and rocky, with a dangerous reef, and heavy breakers extending some distance to the southward. Eastward of Elizabeth Point the shore is sandy.

Elizabeth Bay is about 4 miles wide at its entrance between Elizabeth Point and the reefs extending from Possession Island, and 3

miles to the head of the bay. It has a coastline of sand and rock, within which is a low plain with shifting sand hills. Inland it is hilly; $5\frac{1}{2}$ miles from the coast is Zweikuppen or Saddle Mount, elevated 1,175 feet, 7 miles southward of which is Dreizack Mount (three-peaked), 1,529 feet high. Behind these hills are the Paps. In fine weather landing may be effected in the southern part of the bay.

The Colonial Mining Co. has a narrow-gage line from Elizabeth Bay, running 17 miles to the station, Kolmanskuppe, which is 10 miles out from Luderitz Bay on the main railway line. An electric pumping station at Elizabeth Bay supplies the mining company with sea water for washing the gravel, the water being led through 4-inch pipes as far as the Colmanskop fields, some 6 miles beyond Kolmanskuppe.

Possession Road—Island.—This island, which shelters Elizabeth Bay from the westward, is 72 feet high at its southern end, 2 miles in length in a north and south direction, and 800 yards broad at its center. Its northern and southern ends are about 2.2 and 1.3 miles, respectively, from the mainland.

Aspect.—The shores of the island are rocky and nearly perpendicular. When seen from a short distance to the southward it appears as a cluster of islets with shoal water between them, for there are three or four peaks joined by intervening low land. The island is tolerably conspicuous when approached from either north or south.

Wreck.—The wreck of the steamer *British Prince*, with hull and upperworks showing above water, lies sunk 700 yards from the southwestern point of Possession Island.

The wreck constitutes a very conspicuous mark.

Flagstaff.—The flagstaff is at the settlement.

North Reef.—Breakers and submerged rocks extend $\frac{1}{2}$ mile northward from the three islets off the northern point of the island.

Kreuz Shoals consist of four heads, the outer head, with a depth of 2 fathoms over it, is situated 1.6 miles 39° from the settlement flagstaff, and the inner head, with $1\frac{1}{2}$ fathoms over it, is 1.1 miles 19° from the same point. The other two heads have depths of 4 and $4\frac{1}{2}$ fathoms over them, situated 1.6 and 1.3 miles respectively northeastward of the flagstaff.

Possession Rock has a depth of 3 feet over it, and is situated 800 yards 71° from the flagstaff.

Buoy.—It is marked by a red cask buoy; it is also marked by the flagstaff in line with the northern corner of a house in the settlement.

South Reef is the rocky and foul ground which extends $1\frac{1}{2}$ miles from the southern point of the island.

Beacons.—Tripod beacons have been erected on the north and south points of the island, the southern one being surmounted by a black cross.

Directions—Northward of the island.—Vessels passing to the northward of the island should give the islets off its north point a berth of at least 1 mile and avoid the shoals extending from it by bearings of the beacon or the junction of the sand and rock at the northern end of the sandy beach on the mainland abreast Possession Island, until the settlement flagstaff is open to the southward of the northern shed, when the anchorage may be steered for, taking care to avoid the 2-fathom patch to the eastward.

Southward of the island.—Give the southern point of the island a berth of at least $1\frac{1}{2}$ miles until the northern point of that island opens eastward of the southeast point, when the anchorage off the settlement may be steered for, passing eastward of the red conical buoy marking Possession Rock, remembering that the flagstaff in line with the southern corner of the southern house of the settlement passes nearly over the rock. The southern passage is said to be preferable. This is most probable as regards sailing vessels, as they will usually have a fair wind in, whereas from the northward they would have to beat in, keeping as far as possible to the directions given above.

Anchorage.—There is good anchorage and smooth water on the eastern side of Possession Island in about 4 or 5 fathoms water, $\frac{1}{2}$ mile northeastward of the flagstaff.

Tides.—It is high water, full and change, at Possession Island at 2 h. 16 m.; springs rise $4\frac{1}{2}$ feet.

Landing.—Boats can land at the settlement pier in all weathers; in other parts of the island it is difficult. On the mainland it is best at the southern part of the long sandy beach opposite the settlement, but local advice should be obtained before doing so.

Population, etc.—The population of Possession Island (1904) consisted of 3 white men and 5 natives, who collect the guano. Sun water condensers are used here.

Supplies.—No provisions excepting a small quantity of water and occasionally some penguins' eggs are obtainable. Fish of excellent quality may be caught in great abundance about the shores.

The coast.—From the point abreast the south point of Possession Island the coast trends in a southerly direction for 2 miles to the northern point of a slight indentation. Off this point rocks extend $\frac{1}{2}$ mile to the southward. From thence the coast, off which are several rocks, curves southeastward to Bol Point.

Prince of Wales Bay is about 6 miles southward of Possession Island; it is a small indentation in the coast line. The bay curves round to the west and northwestward, having five small islets off its eastern shore and a tongue-shaped mud flat near its head. Its western point has an islet and several rocks awash extending 400 yards north-

ward from it. There is also a shoal with $3\frac{1}{2}$ fathoms over it about 1,200 yards 317° from the point.

A light line has been constructed from Prince of Wales Bay to Arch Rock, and passes through Pomona en route. The Pomona diamond mining district commenced working in 1912.

Buoy.—A white spar buoy, surmounted by two cones, and with this inscription, "Prinzenbucht N," has been established in the northern entrance to Prince of Wales Bay.

Anchorage.—Good anchorage for small vessels may be obtained in from 4 to 6 fathoms 600 to 800 yards northeastward of the southwestern point. The landing is on a very shelving sandy beach. There is a road leading to the interior and a track to Luderitz Bay.

Albatross Island.—About 1,400 yards westward of the western point of Prince of Wales Bay and the same distance from the mainland is Albatross Island, the largest of a group of small low islets, of volcanic formation, and about 1,300 yards in length; there is a shoal patch of $3\frac{1}{2}$ fathoms 900 yards 1° from the northern point, and foul ground with several rocks awash, on which the sea breaks, nearly $1\frac{1}{2}$ miles in a southwesterly direction.

Rock.—A rock with less than 6 feet, marked "P. D.," has been placed on the chart at a distance of 1,600 yards 23° from the northern point of Albatross Island. The steamer *Ingerid*, having a draft of 12 feet, struck on this rock. The position given is very indefinite.

Albatross Channel is between Albatross Island and the mainland; it has depths of 11 and 12 fathoms in mid-channel.

The coast from the western point of Prince of Wales Bay trends to the southward for nearly 4 miles to Jammer Bay, and is fringed with rocks and breakers. From thence it trends to the southwestward to Pomona Island for $1\frac{1}{2}$ miles. The hills range in this part of the coast from 157 to 440 feet in height.

Pomona Island.—This island lies about 5 miles to the southward of Albatross Island. A flagstaff and beacon with a cross topmark stand on the eastern side of the island. Vessels may anchor off its northern end in 5 or 6 fathoms, good holding ground.

Rocks.—A rock, awash, lies 400 yards northward of the flagstaff, and a submerged rock between the island and the mainland.

Landing—Water.—Abreast Pomona Island there is a landing and a road leading northward and southward. There is also a well of brackish water in this vicinity, about 1 mile southeastward of which is one containing fresh water.

The coast.—From Pomona Island to Orange River, the northern boundary of the British Dominions of the South African Union, the coast trends southward for a distance of 41 miles to Sinclair Island and thence southeastward for about 68 miles. The shore along the whole extent of this coast is most desolate in appearance,

and without the least sign of vegetation, but the bones of whales are found strewn about in great abundance. The coast is studded with numerous small islets and reefs, about $\frac{1}{2}$ mile offshore; but there are no dangers beyond the distance of 1 mile from the land. To the northward of the Orange River the coast, as before remarked, presents a chain of rocks or islets, some of them bearing the most fantastic shapes.

Caution.—This coast has recently been reported to be considerably out of position. Generally speaking, it projects more to the westward than shown on the charts. Every precaution should therefore be taken in approaching it.

Van Reenan Bay is merely an indentation in the coast, without any shelter, and anchorage even in fine weather is rendered unsafe in consequence of the shoal water in every part of it. Off the northern point of the bay are two small islets, about $\frac{1}{2}$ mile from the mainland, on which a few fur seal may be taken in the proper season, and outside these islets anchorage may be had during fine weather.

Black Rock is charted in the northern part of the bay.

The landing on the southern side of the bay is good and it is an eligible place for trading with natives, who inhabit a small village which stands in a pleasant valley 10 miles inland. They frequently stray down to this place in search of shellfish and will dispose of sheep, bullocks, and ostrich feathers on very favorable terms. The whole coast in this neighborhood is a complete sandy desert, with the exception of a few rocky hills of volcanic formation.

Arch Rock is a large rock about 4 miles southward of Van Reenan Bay, which seems to have been of some extent; but the sea, or other cause, has carried away its center excepting a surface of about 20 feet deep, which rests on two extremities, forming an archway 100 feet high. From the northwestward or west the arch is not at all distinct, but it shows up well against the light-colored coast line when bearing 9° .

Dreimasterhuk is a small bay 7 miles southward of Arch Rock. Between this and Plum Pudding Island much foul ground is shown.

Plum Pudding Island is a small island situated about 12 miles southward of Arch Rock and a little over a mile northward of Angras Juntas Bay. When bearing 357° it appears as a pyramid with a low mass of rock on its western side.

Angras Juntas is a small bend in the land, running into the eastward about 1 mile, the width of its mouth being $1\frac{1}{2}$ miles: here ships may find tolerable shelter, with southerly winds. The shore about the southern point of this bend is composed of conspicuous dark and variegated rock. At the entrance to the bay there are 14 fathoms water, gradually decreasing to 5 fathoms, about $\frac{1}{2}$ mile from the head of the bay, sandy bottom.

Anchorage.—The best anchorage is in 6 fathoms under the southern shore, about 600 yards from the southwestern point.

Sinclair Island is the name of the small island lying in the southern part of Angras Juntas Bay. It appears to be joined to the mainland by a neck about 20 feet in height.

Cape Dernburg is shown about 3 miles south of Sinclair Island, with some small rocks or islets in the bay immediately to northward of it.

From this point the coast is charted running about $15\frac{1}{2}$ miles southeast by south to the head of Chameis Bay. Between Chameis Bay and Orange River the coast line forms an almost unbroken straight line to southeastward 60 miles in length.

Coast.—The coast northward of Orange River extends as an undulating sandy plateau, upon which there are no conspicuous objects until, at a distance of about 25 miles north of the river's mouth, the land in the vicinity of the shore somewhat lowers; on easterly bearings a flat-topped range is seen above this lower land, and a much higher range, the summit of which is well defined, shows out at a considerable distance beyond to the northeastward.

This dip in the land on the coast has the appearance of a river bed; the southern rise, when it bears southward of 65° , appears to terminate in a step, with a patch of sand below it, which tends to make it more conspicuous when seen in the afternoon. There are some sand hills inland of this dip, their flat tops apparently consisting of bare sand, which shows clearly in the afternoon.

Northward of this the coast resumes its monotonous appearance for a few miles, when a break is seen to the northward, where the land, after maintaining nearly the same height for some distance, is lower, and slopes with three slight steps to an apparent point. These steps on a nearer approach are seen to be sand hills, some of which are flat topped, while others rise to sharp peaks; these hills are more conspicuous when seen from the southward than from the northward, for in the latter case the sharp peaks, being lower than the land behind them, do not show out so clearly, though the vicinity of a high summit inland will serve to point out their positions.

General remarks.—Nothing can be more uninviting than the appearance of the coast between Walfisch Bay and Orange River, which is composed of a long range of sand hills, excepting that portion between Spencer and Hottentot Bays, where there is a range of barren, desolate precipices 600 feet high, more forbidding in aspect, if possible, than the rest of the coast.

The Paps.—Proceeding along the land between Luderitz Bay and Possession Island, or when making the land from seaward, the position of the vessel may be confirmed by two remarkable peaks named

the Paps, one being on a near and the other on a distant range of sand hills. In clear weather these peaks are very conspicuous, and when in line bear 53° , but their exact positions are unknown.

Winds.—During nine months of the year, from August to May, southerly winds prevail and blow with the regularity of monsoons, but are stronger in proportion as the south latitude increases, while to the northward, although the direction from south to south-southwest continues the same, the breezes are more moderate, and at Walfisch Bay land and sea breezes are experienced. The force of wind on the south coast of Africa, night and day, ranges usually from 5 to 9, while to the northward the range is generally only from 1 to 5. Short intervals of calm or light winds sometimes occur after a gale.

Great care is necessary in approaching any of the anchorages for a sailing vessel to be under snug canvas, as a moderate breeze outside is no criterion of the strength of the wind to be met with inside, where it may probably be blowing a moderate gale. The wind appears to blow hardest at full and change of the moon all the year round, and gales generally occur at that time. The southerly wind blows hardest with a clear atmosphere and cloudless sky.

During the remainder of the year, from May to August, is the season for northerly winds. They are reported to be more irregular and less strong than the southerly, but are succeeded by those much-dreaded rollers which make the coast generally so unsafe at this season of the year. These rollers also set in occasionally after a southerly gale, but are not so heavy and therefore not so dangerous.

Haze and fog.—A thick haze generally hangs over the whole of this coast during the early part of the day, particularly at the distance of from 4 to 6 miles offshore; but it generally clears off about 3 or 4 p. m. The breakers on the beach are frequently seen under the haze, while the land is barely discernible.

There is no rain during the southerly winds, but generally very heavy dews at night, with occasionally a very dense fog, with large drops of dew-like heavy rain. A thick fog bank on the western horizon, with a well-defined line between it and the sky, is a sure indication of a strong southerly gale.

Current.—The current along the whole of this coast runs steadily to the northward at the rate of from 10 to 25 miles a day, except in the month of June to the northward of Walfisch Bay, when there appears to be an eddy to the southward.

Temperature.—The mean annual temperature of the air in the neighborhood of Luderitz Bay is about 63° , and at Walfisch Bay 64° ; but the temperature is invariably 4° or 5° lower on the coast than out at sea.

The barometer on this coast ranges from 29.9 to 30.1 inches.

The following general observations on this portion of the coast are extracted from the Okavango River, a Narrative of Travel, Exploration, and Adventure, by Charles John Anderson.

The prevailing local wind, extending from 60 to 200 miles from the shore, along the whole length of this coast, is from south by west to southwest by south. Indeed the south wind, varying considerably, of course, in strength, blows for about nine months in the year. During this time the sky overhead is clear and cloudless, though the horizon, with a space of from 14° to 20° above it, is often enveloped in so deep a haze that the land from eastward is completely hidden, and the approach to the coast thus rendered extremely difficult and dangerous. The sound—aye, even the sight of the surf—is generally the first intimation seamen have of their vessel's proximity to the land. During the remaining three months of the year the sea is often calm, or light breezes prevail from the north northwest. These northerly winds are generally accompanied by dense and very damp fogs.

In the summer season, when the weather is calm, and the sky without a cloud, the sun is very powerful; but generally speaking, and more especially during the prevalence of the southerly winds, the temperature is very low. Thick woollen clothing is even necessary, for the wind is at times so keen as to peel off the skin of the face, and to make the lips sore. The temperature never varies much, averaging during the year in the shade 50° to 60°.

The directions given in this quotation are probably magnetic.

CHAPTER XII.

ORANGE RIVER TO CAPE ST. MARTIN.

Orange River.—This river, known as “the Gariep” by the natives, falls into the South Atlantic Ocean in latitude $28^{\circ} 38'$ south, longitude $16^{\circ} 27'$ east; it is one of the largest in Southern Africa and extends nearly across the whole continent from west to east and forms the northern boundary of the British possessions as far as the twentieth meridian of east longitude, known as the State of the Cape of Good Hope. The source of the Orange River is in Kaffraria and traversing the Hottentot country in a westerly direction for a distance of 900 miles receives the waters of numerous important affluents.

Rich and extensive copper mines exist near its banks, and gold is to be found in the mountains, as small quantities have been discovered in the bed of the river, as well as precious stones. Copper ore has recently been found on both banks of the Orange River. The physical obstacles, however, by preventing the means of transit and embarkation will, so long as they exist, prevent the resources of the country from being developed.

Aspect.—Around the mouth of the river the land is low, with good pasture on its northern side, but at the distance of 8 or 9 miles in the interior are seen some hills, which farther back rise into mountains, flanking the river, the banks of which are inhabited by farmers possessing large herds of cattle and sheep.

Beacon.—A beacon has been erected for surveying purposes on the northern entrance point of the river, and forms a useful landmark. It is a tripod beacon, carrying a four-sided shield and surmounted by a pole with triangular topmark 53 feet above the ground and 71 feet above high water.

Approach.—At the distance of 100 miles off the mouth of the Orange River large quantities of seaweed have been observed, and the color of the sea has been noticed to change from a deep blue to a light green. The current has been found setting to the north-northeastward.

Bar.—The mouth of the Orange River is barred by extensive banks of sand based on a rocky plateau, extending 6 miles offshore, on which the sea constantly breaks. The fact of the river being barred is a serious drawback to the vast resources of the country it drains;

and were it otherwise, and the river navigable, it would become one of the most important in South Africa.

The breadth of the entrance is about 170 yards, while inside, the river, upward of 1 mile across, is dotted over with numerous reedy isles, abounding in wild fowl.

Landing is impracticable at all seasons of the year. Persons, therefore, wishing to communicate with the natives must land at Cape Voltas, 5 miles to the southward, and walk.

Navigation.—Of the Orange River, that portion alone is navigable which very nearly adjoins the sea, and then only for small craft, and at certain periods of the year; in the dry season shoals and sand banks are everywhere visible in its channel. Even higher up, the navigation is frequently impeded by rapids and waterfalls, some of which are very grand and beautiful.

Alexander Bay lies about $3\frac{1}{2}$ miles to the southward of Orange River. The entrance of the bay is about 600 yards wide, the sides being nearly parallel, and, though open to the westward, some protection is afforded by a reef of low rocks which stretch upward of 800 yards across from its southern extremity. The bay has a good shingle beach, about 340 yards in length, but the bottom is rocky and uneven, and, although quite deep enough for small craft, it is not to be trusted.

A chain is stretched across from shore to shore, to which a coaster, which occasionally visits the bay, is moored.

Reef.—A long sunken reef extends about 1 mile seaward from the northern point of the bay, over which it is said that the rollers sometimes break very heavily; about $1\frac{1}{2}$ miles to the northward may be seen the surf on the sands off the mouth of the Orange River.

Anchorage.—It would be imprudent to anchor outside, as there are no soundings on the chart and the coast is exposed.

There is occasionally a strong set to the southward out of Orange River, with a southerly wind; it is easily detected by the discoloration of the sea.

Cape Voltas lies about 6 miles to the southward of the Orange River, the intervening coast being low, sandy, and desolate. The cape is a high, bluff point, projecting into the sea, with several rocks lying about $\frac{1}{2}$ mile to the westward of it, beyond which there are no dangers.

Bay.—About 1 mile to the northward of the cape there is a shallow bay, within which the anchorage is not safe, as the ground is foul, and heavy rollers are continually heaving in from the westward at all seasons of the year. Vessels, however, in want of firewood may lie off and on, and obtain any quantity from the head of the bay, where they will find plenty piled up on the beach, having been drifted down the Orange or Gariep River.

Water in any quantity can be had in the bay, in the rainy season, without the trouble of searching for it underground. By digging it may be obtained at all seasons of the year, at a short distance from the head of the bay.

Landing is very safe and convenient, sheltered by two small islands lying close to the beach, inside of which the water is perfectly smooth.

The coast—Aspect.—From Cape Voltas the coast trends in a southerly direction for 65 miles to Buffels River, its aspect being high, while inshore the land rises into mountains. The hill sides are covered with very good grass for the use of cattle, but the summits of these eminences are one mass of volcanic productions.

Peacock Roadstead and its neighborhood may be easily recognized by two very remarkable rocky hills, called the Twins, 403 and 520 feet high, which rise abruptly from the level ground; they appear to be long-backed ridges running nearly at right angles to each other, the northernmost lying north and south, and immediately overlooking Homewood Harbor, which is situated just beyond the southern end of the roadstead.

The coast.—From Homewood the coast, a sloping rocky cliff, runs northerly more than $\frac{1}{4}$ mile, when, bending to the eastward for about $\frac{3}{4}$ mile, it affords considerable shelter of moderate area from the constant ocean swell, and from the southerly winds, which blow during a great part of the year. The rocky cliffs, hence, take a northerly trend for a short distance, when they terminate at the commencement of a long sandy beach.

The soundings in Peacock Roadstead are said to be regular, deepening from 4 to 5 fathoms, at a few yards from the cliff, to 12 and 14 fathoms, at a convenience distance for anchorage, but no soundings are shown on the chart. The bottom is a sandy mud, with the addition of small shell at the greater depths, where there are also indications of rocky patches.

Harrison Cove is a small indentation in the coast, about 100 yards in extent, at the southeastern part of Peacock Roadstead. From seaward this cove has the appearance of a quarry, but it is not very conspicuous. It is open to the northwestward and has no reef, but is considerably sheltered from the southwesterly swell and winds. The bottom is rocky and the soundings uneven, and although there is sufficient depth it is not safe anchorage for even one small vessel; but in very fine weather a small craft might be able to let go an anchor outside, with a long scope, and haul in for a few hours for the convenience of loading.

A ledge of rocks entirely spoils a good, even, shingle beach, which is formed by high water at spring tides, and must render landing

difficult at all times excepting at a small sandy spot. There are also some loose rocks, which also materially interfere with the landing.

Coves.—Between Harrison Cove and the southern point of Peacock Roadstead there are several narrow chasms in the cliff open to the northward into which boats can enter. Opposite these openings there is a suitable depth and good bottom at a convenient distance for dropping anchor to haul out by, and probably it would, in southerly winds, often be better to use these places nearly abreast of the anchorage than to warp loaded boats up to windward from Harrison Cove.

Homewood Harbor, lying close under the Northern Twin, is nearly circular, with receding sides rising from heights varying from 60 to 80 feet, and suggests the idea of an enormous ancient amphitheater. There is sufficient space on the southern side, with about 12 feet of water, for two small craft to lie at all times in safety if secured to proper moorings. The bottom is rocky and uneven. The entrance is open to the westward and very narrow and difficult, having to be taken obliquely, as rocks project from the northern side nearly halfway across.

In very moderate weather, with a southerly wind, there is frequently a heavy break right across. The southern side is exceedingly well sheltered, the high southern side protecting it from the wind from that quarter and the narrow entrance left by the rocks on the northern side being nearly shut in from the winds from the northward. The northern side of the harbor is rocky and shoal, and a sea is constantly sent into it by the slightest southerly wind, while the opposite side is scarcely rippled by a strong breeze from that quarter.

At about the middle of the harbor a spur of rock runs out to a considerable extent toward the southern point; it has 9 or 10 feet alongside of it and several large boats might load on its southern side in perfectly smooth water. The beach at the head of the harbor is of small shingle, and is conveniently steep for loading boats. The height of the side or wall in the rear of it would add considerably to the labor of landing and shipping goods, and also becalm outwardbound craft from the occasional land winds of the morning.

A good sea breeze is required to enter with safety; the "draw-back" through an entrance so narrow in proportion to the water space inside must sometimes be very great; the difficulty of getting out of Homewood Harbor is so considerable that the average detention of a sailing vessel, through the year, would probably be about eight days each trip.

A well has been sunk by a mining company, to the depth of 20 feet, at about $\frac{1}{4}$ mile from the coast, and as, at 18 feet from the surface, moist clay which tasted fresh was obtained it may be expected that if the task be resumed water will be found.

Soundings.—Soundings taken between Peacock Roadstead and Alexander Bay showed great regularity, gradually increasing from 3 to 4 fathoms at about 300 yards from the shore, to 15 and 16 fathoms at 2 miles from the coast, the bottom being of the same nature as that of Peacock Roadstead.

Rollers.—It has been stated that the rollers sometimes break as far out as the line joining Harrison Cove and Alexander Bay.

Sunken Reefs.—At a distance of 2 miles 228° from the Southern Twin is a sunken reef of rocks, extending upward of 1 mile from the coast. This shoal breaks with a heavy swell, and is very dangerous to strangers, as frequently there is no break on it beyond a short distance from the shore.

About 3 miles southward of this reef, and in a southwesterly direction from Sandkop, a hill on the coast 71 feet high, sunken rocks of the same character extend about 1 mile from the shore.

Soco Reefs, a patch of rocks nearly 1 mile in extent, and which usually break, are situated $1\frac{1}{2}$ miles southward from Wreck Point, and about $\frac{3}{4}$ mile from the shore.

Holgat River.—From Wreck Point, the coast trends southeastward for $8\frac{1}{2}$ miles to Holgat River, off the northern point of which rocks extend about $\frac{1}{2}$ mile.

Water.—There is a fresh-water spring 4 miles up Holgat River, and fresh water may be obtained in winter at Jackals Pit, on the shore, 9 miles southward of Holgat River.

Rocks.—A rock which breaks occasionally is situated 213° , distant $2\frac{1}{2}$ miles from Cliff Point, nearly 2 miles from the coast, and is therefore a danger to navigation. Between Holgat River and Port Nolloth, rocks extend from $\frac{1}{4}$ to 1 mile from the coast.

Port Nolloth (Robbe Bay).—This little port is situated in a slight indentation in the coast. Inland, on a range of conspicuous sand hills, about 600 feet high, 5 miles eastward from the port, is a patch of reddish sand; this, with the hills themselves, is of assistance in identifying the locality.

North Point is the northern point of the indentation; it is rocky, and has a ledge of rocks extending 200 yards from it, off which there are breakers.

Beacon.—A white beacon with a barrel topmark, elevated about 70 feet, stands about 600 yards southeastward of the point.

South Point is a rocky projection, 1.7 miles southward of North Point, with similar ledges extending from it.

Beacons.—A black beacon with a barrel topmark stands about 340 yards eastward of the extremity of the point. At 950 yards 112° from it stands another beacon, with triangular topmark. These beacons in line mark the outer anchorage.

Leading beacons.—About 1,800 yards northward of South Beacon stands E Beacon, without a topmark, 440 yards 65° of which is F Beacon, with a triangular topmark, and 120 yards West Carl von Schlick Beacon, a stone beacon 6 feet high. These beacons in line 65° lead over the bar.

Light.—From a white iron column near Carl von Schlick Beacon a flashing white light is exhibited. The light is elevated 60 feet above high water, and visible 13 miles.

Owen Island is superficially oval-shaped, 10 feet high, about 200 yards southward of South Point, with which it is connected at low water by a rocky ridge, but at high water and in very fine weather there is a boat passage between it and the point.

Fog explosive.—There is a fog explosive on the western end of Owen Island giving from sunrise to sunset during foggy weather.

Outer anchorage.—The best anchorage outside the bar is in 138 feet (23 fathoms), sandy bottom, with North Beacon bearing 48° and the two South Beacons in line 112° . Inside this the bottom is rocky. Vessels frequently roll heavily. The anchorage recently recommended is in 180 feet, with the pierhead and Black Jacob Rock in line, but anchorage is bad anywhere, and vessels should be prepared to leave at shortest notice.

Landing should not be attempted in ships' boats. Tugs are available for the purpose.

The port is formed by a reef of rocks which partly dry at low water, and Robbe Islet; the reef, on which is Black Jacob Rock, which dries, projects from the southern point of the bay and runs to the northward about $\frac{3}{4}$ mile, keeping nearly parallel to the shore, and a little more than 500 yards off it. Near its extremity is a shoal head, with 10 feet on it, named South Blinder. This reef almost meets another one of the same nature, which runs to the southward from the northern point of the bay, having North Ledge, which dries near its center, and the North Blinder, with 12 feet on it, at the outer end.

Bar.—The passage between the extremes of these two reefs is about 350 yards wide, but this is nearly filled up by a rocky shoal called the Bar, with 13 to 17 feet over it, and on which in fresh winds the sea breaks heavily; the breakers sometimes extend right across the passage for three days consecutively, when all communication is stopped.

Buoy.—A bellbuoy is moored about 50 yards inside the bar, a little to the southward of the leading line.

Inner Blinder is a dangerous rocky shoal which covers at three-quarters flood, 800 yards south-southwestward of Carl von Schlick Beacon; it is marked by a staff and cage.

Buoy.—A buoy marks its eastern edge, and guards the shoal patches southeastward of it.

Robbe Islet, 3 feet high, lies between the southern reef and the mainland; it is surrounded by rocky ledges, which dry at low water, and thus forms good protection to the anchorage off the town.

The channel along the shore to the northward of the pier, with an average depth of 11 feet water, was opened in 1885 by blasting and dredging. The prevalent current to the northward through the port does not scour it, and in consequence it has silted up considerably by the strong east winds blowing the sand offshore, through the bushes and scrub being removed which used to bind the sand and prevent its shifting.

Buoys.—The port hand side of the channel on entering is marked by six buoys, the buoy off the Inner Blinder being on the starboard hand side.

The anchorage is inside Robbe Islet, which, together with the rocks that extend from it on all sides, and which dry at low water, forms a capital natural breakwater to the anchorage, in which vessels drawing not more than 8 or 9 feet may lie in safety, for although the sea may break heavily on the reefs and across the entrance, no heavy sea comes far within the reefs.

Pilots.—A pilot may be obtained by making the usual signal, and strangers should not attempt to enter the port without one.

Danger signal.—The signal L. M. G., Commercial Code, is hoisted when it is dangerous to cross the bar.

Tides.—It is high water, full and change, at Port Nolloth, at 2 h. 35 m.; springs rise $5\frac{1}{4}$ feet, neaps $3\frac{1}{2}$ feet.

Directions.—A vessel drawing 8 or 9 feet can only enter the port at high water; the marks for crossing the bar are the beacons E and F and the Carl von Schlick Beacon in line 65° ; a distant conspicuous sand patch is also in the same line. This will lead across in about 15 feet at low water but close northward of a rocky head of 13 feet and the bellbuoy, after passing which the bar will be crossed. and a vessel may haul gradually around for the anchorage, passing to the westward of all the buoys marking the channel except the buoy about 200 yards eastward of the Inner Blinder. Anchor a little to the southward of the pier in about 10 to 12 feet water, with the northern end of Robbe Islet bearing 262° .

South channel.—There is a very narrow passage through the reef in the southern part of the bay, with from 10 to 15 feet water. It is called the South Channel, and through it the current enters which runs in the anchorage.

Town.—The town, having perhaps a population of about 200 whites, nearly all of whom are connected with the copper works, is built along the lowland which lies just above a good sandy beach abreast of Robbe Islet. It has a customhouse and post office, etc.,

and is a place of some importance, being the principal shipping port for copper on this coast. There is a tramway which runs direct from the mines down to the pier, where a small vessel in fine weather may lie alongside and take in her cargo. Heavier draft vessels lie in the outer anchorage, where they are loaded by means of tugs and lighters.

The observation stone is at the back of the magistrate's house, 450 yards northeastward of the pier. It is in latitude $29^{\circ} 15' 12''$ south and longitude $16^{\circ} 52' 2''$ east.

Patent slip.—There is a small patent slip which has a length on cradle of 75 feet; breadth, 11 feet; depth at high water, forward 6 feet 9 inches, aft 10 feet 5 inches; and a lifting power of 120 tons.

Trade.—The export of copper ore is about 30,000 tons per year; the steamers that bring out coke for smelting return with ore.

Port office.—A signal station has been established at the port office.

Communication.—Port Nolloth is in telegraphic communication with Cape Town, and steamers run to and from that place every four weeks.

Railway.—The Cape Copper Co. own and work a mineral line from Port Nolloth to Vokeip, a distance of 92 miles.

Coal.—From 6,000 to 7,000 tons of coal are annually imported, and about 100 tons are usually kept in stock by the Cape Copper Mining Co.; delivered alongside in lighters of from 30 to 120 tons burden, towed off by a tug. Ships outside the bar could not coal in strong winds. The wood of a low gum bush with which the land is covered is said to burn well.

Supplies.—Beef of good quality is obtainable, but vegetables are very scarce. Bread in any quantity can be procured at a day's notice.

Water.—Much water is obtained from the heavy dews which fall, and water is brought down every day from inland by the tramway from the copper mines.

Current.—The current in the port, which attains a velocity of from $\frac{1}{2}$ knot to 3 knots an hour, according to the strength of the southwesterly winds, enters by the South Channel as before mentioned, and, after passing through the anchorage, runs out to the northwestward across the bar, and the southern part of the North Reef, losing some of its strength as it crosses. Outside the reef the current runs to the northward at the rate of $\frac{1}{2}$ to 1 knot an hour; northerly winds check the current, and, with a continuance of the same, it will run in the opposite direction, seldom, however, attaining a greater velocity than $\frac{1}{2}$ knot per hour.

The current in the month of July, 1891, was observed to have a southerly set, at times attaining a rate of 3 knots an hour; this was

dependent greatly, however, on the direction of the wind, and it ceased entirely with fresh southerly breezes.

Meteorology.—From the mean of observations taken for 17 years. it rained on 17 days annually, the mean annual rainfall being 2.1 inches; the greatest quantity fell in the autumn and winter, the wettest month being May. Inland the amount increases, it being about four times as large as Springbok.

Fogs are prevalent at Port Nolloth.

Owen Bay.—Between Port Nolloth and MacDougall Harbor is a very small indentation called Owen Bay, which, although open to the southward, would probably, in a strong breeze from that point, receive considerable protection from the northern part of the reef of MacDougall Harbor; in northerly and westerly winds it is well sheltered. There are no soundings shown on the chart, but there is sufficient depth of water for small vessels drawing 8 or 9 feet, over a rocky bottom. It has a conveniently steep, sandy beach, and might prove serviceable as a temporary place of refuge.

The telegraph cable to Port Nolloth, as shown on the chart, passes through this bay, and must be avoided by vessels anchoring.

MacDougall Harbor adjoins Owen Bay to the southward.

The entrance, which is immediately northward of Matthew Rock, situated near the end of the southern reef, is about 100 yards wide, and has a depth of about $1\frac{1}{2}$ fathoms in it, but the place can only be considered a dock, in which a few boats may lie in safety at all times in 4 feet at low-water spring tides. There is a small basin with a depth of $1\frac{1}{4}$ fathoms in it, sandy bottom, eastward of Matthew Rock, in which one or two vessels might, in the summer season, generally lie in safety.

The southern end of the harbor is completely sheltered by a broad and, in parts, high reef, and the water is quite smooth when a heavy surf is breaking outside. It has a sandy beach, on which boats (perhaps small vessels at high water) might be hauled up for repairs, etc., and the sea is so smooth that a vessel could take the ground at low tide without injury.

The soundings and nature of the bottom outside this small harbor appear to be irregular.

On a coast where a vessel or boat may run many miles after missing a bay without effecting a landing, any opening to even partial shelter may be important, and, being close to Port Nolloth, this small place may possibly serve some useful purpose.

Water.—There is a well of slightly brackish water on the beach close to a house, nearly $\frac{1}{2}$ mile southward of Matthew Rock. In two other wells dug near it the same kind of water has been found at a similar depth, 7 feet above the level of low-water springs.

Tides.—It is high water, full and change, in MacDougall Harbor at 2 h. 30 m.; rise at springs, $5\frac{1}{2}$ feet.

Penguin Rocks, about 6 feet high, are situated 21 miles southward from MacDougall Harbor, and lie $4\frac{1}{2}$ miles northward of Buffels River and nearly $\frac{1}{2}$ mile offshore. Rocks which break with a heavy swell extend for a distance of 1 mile to the westward and 2 miles to the southwestward of Penguin Rocks.

The coast to Buffels River, southward of these submerged rocks, which extend $1\frac{1}{2}$ miles from the coast, is foul for nearly 1 mile offshore.

Buffels River.—The locality of this river may be recognized from seaward by a remarkable sand cliff or perpendicular gap of considerable dimensions at the summit of a flat sand hill apparently 400 or 500 feet high. When the sand cliff bears about 115° it is hidden by a nearer range of sand hills.

The river is at times accessible for boats in the rainy season, but only at high water, while in the dry season it is frequently closed by a sandy barrier, formed by the drift of the sand hills in windy weather.

Beacon.—A beacon consisting of a small pile of stones is situated about 3 miles inshore and about 3 miles to the northward of the entrance to Buffels River. The beacon stands on a hill marked 695 feet, but can not readily be picked up except by small craft close to the coast.

Milkbosch Point projects slightly from the coast.

Gourap—Small beacon.—A beacon consisting of a small pile of stones is situated about 3 miles to northward of Milkbosch Point and $1\frac{1}{2}$ miles inshore. The beacon stands on a hill marked 603 feet, but can not readily be picked up except by small craft close to the coast.

Rock.—The master of the German ship *Ostara* reported in 1910 having struck on a rock at a distance of about $9\frac{1}{4}$ miles 306° from the western extremity of Milkbosch Point.

Broken water, which appeared to indicate a submerged reef or wreck, was sighted close to this position by the master of the British ship *Crocodile* in January, 1911.

It appears probable that this is the rock on which the bark *Ocean King* was lost in 1881.

Pending an examination of the locality the symbol for a rock with less than 6 feet over it has been placed on the charts in the position given by the *Ostara* and marked "Ostara P. D. (1910)."

On two occasions in 1911 search was made for this rock by the British naval vessel *Mutine*, but no danger was discovered.

The coast.—The coast between Buffels River and Hondeklip Bay is rocky, with breakers and dangers extending 1 mile from it. In-

shore are hills generally over 400 feet high, the highest of which is Zwart Kop, elevated 931 feet. About 5 miles southward of this peak and a little inland is a very conspicuous sand patch, the upper part of which is long and narrow. Zwart Lintjes River, 29 miles southward of Milkbosch Point, is entirely barred by sand and rocks extend $\frac{1}{2}$ mile from it.

Rocks.—A rock, which breaks with a heavy swell, lies 176° , distant 6 miles from Milkbosch Point and $1\frac{1}{2}$ miles northwestward from a rock 8 feet high near the coast.

About 10 miles southward of this (8 feet high) rock are two sunken rocks, about 1 mile apart and $1\frac{1}{2}$ miles offshore, which break with a heavy swell.

Hondeklip Bay.—Hondeklip (Dogstone) Bay owes its name to an isolated block of granite, 17 feet high, about 400 yards from the shore, which serves to point out the otherwise undistinguishable position of the bay.

Hondeklip Bay is about 600 yards wide and recedes about the same distance, but rocks and foul ground extend from both entrance points, narrowing the passage into it to 100 yards. The bay is easy of access with the prevailing winds, and moderate weather generally prevails unless the wind should be from the westward, which is seldom the case. There is a good beach in the southern part of the bay, where boats may be hauled up clear of any sea; the best landing place is just inside the rocks at the western part of this sandy beach. There is a signal staff in the bight of the bay, from which replies will be made to signals from ships, and another on the point to the southward. On the point also are two black cask beacons.

Thick fogs are prevalent at some seasons, especially in the early part of the day.

Anchorage.—The best anchorage outside appears to be in a depth of 10 fathoms, with the inner flagstaff bearing 104° , distant about 1 mile, but it is quite an open roadstead, with indifferent holding ground. To the southward, about $\frac{1}{2}$ mile westward of the south entrance point, there is some uneven rocky ground with depths of 5 fathoms, which should be avoided. In this space occasionally there are heavy rollers.

The anchorage inside the bay is only about 200 yards in extent, with depths of from 1 to $1\frac{1}{2}$ fathoms in it. It is therefore only suitable for small vessels. Moorings have been laid down for the small steamer which brings supplies from Cape Town.

Water.—There is no fresh water at Hondeklip; that required by the few persons residing there, excepting a small quantity preserved during the rains, is brought from Cape Town. The brackish water of the Zwart Lintjes River is used for cattle.

Tides.—It is high water, full and change, at Hondeklip Bay, at 2 h. 30 m.; rise of tide at springs, $5\frac{1}{4}$ feet.

Current.—The current on the coast usually runs to the northward, but after a long continuation of northerly winds it sets to the southward.

Plaat Klip Point Beacon.—There is a large barrel beacon erected on a pile on this point.

Roodewall Bay.—The head of this bay is almost bounded by a perpendicular cliff of red sandstone of about uniform height—36 to 40 feet—surmounted by a sloping bank of white sand of nearly the same elevation. The bay appears to have silted up, and the anchorage used by the British naval vessel *Frolic* in 1854 is now all breakers. The rest of the bay affords no protection from southwesterly winds.

The red cliff, with its crest of white sand, is easily recognized seaward when bearing about 64° .

Tides.—It is high water, full and change, in Roodewall Bay. at 2 h. 30 m.; rise of tide at springs, $6\frac{1}{4}$ feet.

Spoeg River Bay.—About 1 mile to the southward of Roodewall the occasional Spoeg River debouches into a sandy bay about 1 mile in length, which is much sheltered from the southwestward by a group of rocks about $\frac{1}{2}$ mile from it, but is quite unprotected from the northwestward. The soundings show an even sandy bottom, gradually shoaling from about 13 fathoms at a short distance from the rocks; at about 100 yards from the shore there was always a considerable surf, immediately outside of which is a depth of 7 or 8 feet.

The Rocks, which break the force of the southwesterly swell, appear to be nine in number. This group of rocks frequently shows no break, but in a fresh southwesterly breeze the breakers extend throughout the group. The northernmost rock lies 244° , distant $\frac{1}{2}$ mile from the southern point of Spoeg River Bay; it is only a few yards in extent and has 6 and 7 fathoms around it. From it the patch extends $\frac{1}{2}$ mile in a southeasterly direction toward the south point of Spoeg River Bay and is about $\frac{1}{4}$ mile in breadth; from 7 to 9 fathoms were obtained close along the outer edge of the surf.

There appears to be also a clear passage of about $\frac{1}{4}$ mile, with a depth of 4 or 5 fathoms, between the southernmost rock and the southern point of the bay. The soundings outside decrease very regularly from 20 fathoms, about $\frac{3}{4}$ mile seaward of the rocks, to 8 or 9 fathoms within a few yards of them.

Landing.—The only landing place appears to be on the rocky shore of the southern side, about 200 or 300 yards southward of the river, but even there it would be necessary to adopt some contrivance

for the loading of boats, as at low water they would be unable to approach within some yards of the shore.

Roodewall Hill—Beacon.—About 8 miles to the southward of Roodewall Bay and $2\frac{1}{2}$ miles inland is a stone beacon 14 feet high and elevated 636 feet above high water, on one of the trigonometrical stations used by the British Astronomer Royal at the cape for measuring an arc of the meridian, and in which in clear weather makes a very conspicuous seamark; it is on the bare granite top of Roodewall Hill, which rises rather abruptly on the north and south sides, the former being the steeper of the two.

Strandfontein Point, $2\frac{3}{4}$ miles westward of Roodewall Beacon, has sunken rocks, which break, extending off nearly $\frac{3}{4}$ mile.

Remarks.—In concluding his report (1854) Commander Nolloth observes:

Although the *Frolic's* visit to the coast in about the finest time of the year may have afforded us but little experience of its general character, yet, as it is considered to be frequently unsafe at all seasons, it may be stated that during our two months' absence we have only experienced a close-reefed topsail breeze for a few hours on two occasions, and that the land has never been a lee shore except in a light westerly wind of short duration.

Although we have had a considerable portion of foggy weather, which is said to be most common at this season, it has been accompanied by calms or light winds, which has enabled us to anchor, or to put the ship's head off the shore. We met no irregular currents, excepting in the vicinity of the Orange River; and with regard to rollers, which are said to be of frequent occurrence at all times of the year, and which must be very dangerous to vessels in the small open bays, or anchored in bad holding ground near the shore, our negative experience is satisfactory, as we have seen no rollers properly so called.

Generally, excepting near the latitude of Peacock Roadstead, we found rocky bottom inside of 30 fathoms, and beyond this a gradually increasing depth, with a tenacious green mud, to about 80 fathoms, at 15 or 16 miles from the shore.

The coast between Hondeklip Bay to Braak River is fringed with sunken rocks and breakers extending 1 mile from the land, southward of Braak River, as far as Olifant River; it appears to be almost free from offlying dangers. It has no conspicuous objects on it except a large rock apparently close to the coast in the vicinity of Zout River. As the soundings are few and far between, great care should be exercised when running along this coast toward any of the small bays.

Aspect.—Between Roodewall Beacon and Krakeel Klip, 57 miles to the southward, the coast possesses scarcely a feature that can be identified at any distance, and the hills are long ridges without defined summits. Eastward of Braak River, and about 14 miles from the coast, is Louis Fontein Mountain, 1,859 feet high. There is also a very high range of hills at a considerable distance inland.

Bitter River is $2\frac{1}{2}$ miles southward of Strandfontein Point, the southern point of the bay in which it is situated has some rocks 6 feet high off it.

Twins.—These sunken rocks, which break with a swell, are situated 12 miles southward of Bitter River and nearly 1 mile offshore.

Groene River, situated about 17 miles to the southward of Bitter River, is closed by sand banks.

Braak and Zout Rivers.—The Braak River is situated in latitude $31^{\circ} 6'$ south and has sunken rocks extending nearly 1 mile from the shore. Zout River is in latitude $31^{\circ} 15'$ south and nearly 11 miles southward of the Braak. Both these rivers appear to be closed.

Krakeel Klip, a hill 15 miles eastward of Zout River entrance, with its summit elevated 1,131 feet above high water, though situated 10 miles inland, is the best landmark for that part of the coast lying between the Zout and Olifant Rivers.

Elephant Rock, or Morrell Island, is 50 feet high, and lies about 800 yards from the shore, to which it is nearly joined by a reef of rocks above water; there is also a reef about 200 yards in extent running off from its western point.

Olifant or Elephant River.—This river debouches into the south Atlantic in latitude $31^{\circ} 42'$ south, longitude $18^{\circ} 11'$ east, and Capt. Morrell in describing it observes:

This river is not navigable for vessels, nor even boats, unless the sea is very smooth, as there is a bar stretching across its entrance, with only 2 feet water on it; and as the westerly swell is constantly heaving in on this coast, there are generally heavy breakers on the bar. But within this bar there is plenty of water for a large ship for the distance of 2 miles up the river in front of a small village, where several Dutch farmers reside. If there could be a passage cut through the bar at the mouth of this river, it would be the finest harbor on the west coast of Africa. The inhabitants are principally engaged in rearing cattle, only cultivating sufficient grain for their own consumption. Fish may be caught in great abundance in the mouth of this river, within the bar.

The coast.—Capt. Morrell, writing of the coast to the southward of Olifant River, observes:

The land between Elephant River and St. Helena Bay deserves a few descriptive remarks. Bluff sandhills moderately elevated are seen from 100 to 300 yards back from the beach. About $\frac{1}{2}$ mile from the latter the sandy ground begins to terminate and the soil to commence; and another $\frac{1}{2}$ mile farther inland brings us to good soil, where the plains are as fine for grazing as any in the world.

Between the beach and the sand hills just mentioned there is a fine road, running a great part of the distance between the two places. The whole coast along here exhibits unequivocal evidences of its once having been agitated by volcanic eruptions; such as lava in irregular masses, with different strata distinctly defined. Pumice stone is scattered over the country for many miles inland, forming irregular hills, interspersed with lava, basalt, and other volcanic productions.

Thorn Bay, about $7\frac{1}{2}$ miles to the southward of Olifant River, is only accessible to boats. There is a sheltered sandy beach for

landing, but the approach to it is somewhat intricate, and should not be attempted without local assistance. There is a small store in the bay. In 1902 the British naval vessel *Blanche* anchored about 1 mile offshore in 20 fathoms of water.

Donkin Bay.—About 15 miles southward of Olifant River is Cape Donkin, to the northward of which is Donkin Bay, $1\frac{1}{2}$ miles across, where anchorage may be found in from 10 to 6 fathoms, sandy bottom; but as the bay is open to the west it affords no shelter. The shores of the bay are composed of sand, on which the sea breaks heavily.

Aspect.—The coast in the vicinity of this bay is very level, and when 5 miles from the land there are few objects near the shore by which a vessel's position may be determined; inland there is a remarkable tableland of moderate height, which terminates in a perpendicular bluff to the northward. This is hidden on southeasterly bearings behind the nearer land when about 4 or 5 miles from the coast, although the bluff is sometimes seen when farther to the northward, it would not attract a stranger's notice so readily as it does when seen from a position farther to the southward.

Soundings.—At about 5 miles from the shore, northward of Donkin Bay, the depths were found to be very regular, with depths of from 55 to 58 fathoms, the bottom consisting generally of mud.

Lambert Bay, about 9 miles to the southward of Donkin Bay, is about $\frac{1}{2}$ mile across and is partially protected by Penguin Island, but the southwest swell, though slight outside, frequently comes round the reef, making the anchorage uncomfortable. The bay is open to northwesterly winds but gives shelter from southwestward.

Penguin Island, 40 feet in height, is about 400 yards long in a northwest and southeast direction, and is situated about 200 yards off the southern point of the bay, between which and the island there is a narrow rocky channel. Rocks extend for 540 yards to the northward of Penguin Island, the outer rock being visible at low water. There is a detached rock 10 feet high 150 yards off the northwestern point of the island.

Fisherman's Ledge, situated 1,600 yards to the northeastward of Penguin Island, has depths of from $3\frac{1}{2}$ to 5 fathoms over it.

Beacons.—Two beacons have been erected near the shore on the eastern side of the bay, which, when in line 149° , lead clear of the rocks off Penguin Island. The front beacon is a mast surmounted by a barrel painted in black and white bands; the rear one a mast surmounted by a black triangle with a white center.

Settlement.—The settlement consists of about 20 houses, the inhabitants being engaged in fishing and forwarding supplies to the neighboring farms.

Pier.—There is a small pier with a depth of 4 feet alongside.

Supplies.—Water in small quantities is obtainable from wells. Mutton and vegetables can also be obtained from the farms in the neighborhood. Fish, excepting lobsters, are scarce. Large quantities of guano and penguins' eggs are obtained at Penguin Island.

Anchorage, in 6 fathoms of water, may be obtained with the outer beacon bearing 114° and the detached rock 244° , but steam must be kept at command, as frequently the sea gets up with little or no warning, making the whole bay a mass of breakers. Vessels should proceed to sea directly when the wind comes to the northward of 244° .

Cape Deseada, or Baboon Point, is situated 14 miles southward from Lambert Bay. When seen from about 9 miles to seaward it appears bold, rising at a steep slope from the water, and then extending in a flat-topped range of sand hills, 638 feet high.

A low sandy point, not easily seen, extends from the cape, and immediately north of it is a conspicuous sandy patch.

There is a fishery establishment in the bay northward of the cape.

Shoal.—A rocky shoal, on which the sea breaks in heavy weather, lies with its outer extremity bearing 309° about 3 miles distant from Cape Deseada.

Caution.—Vessels approaching this part of the coast can not be too careful, as it has not yet been properly sounded.

St. Helena Bay.—Cape Deseada is the northeastern point of St. Helena Bay, which extends thence as far as Cape St. Martin, the southwestern point, a distance of 31 miles 220° .

Cape St. Martin is a low, sandy point, projecting from the high land on the western side of the bay, and from it a reef of rocks extends to the northward about $\frac{1}{2}$ mile. From a line joining the boundary points St. Helena Bay falls back to the southward for a distance of 11 miles, the soundings being regular from 26 to 10 fathoms, decreasing to 6 fathoms about 1 mile off the shore in the western part of bay, as far to the southward as the town, from whence the 5-fathom line extends to the eastward, keeping nearly parallel to the shore, and from $1\frac{1}{2}$ to $2\frac{1}{4}$ miles from it, but the depths off this shore appear to be decreasing; eastward of Berg River the bottom appears to be rocky inside the above contour.

The bottom is mostly composed of sand and mud; but a great part of the western side of the bay, from about $\frac{1}{2}$ mile southward of Stamp Neus Point toward the mouth of the Berg River, is bordered with a fringe of rocks, some of which extend $\frac{1}{2}$ mile offshore.

In the summer months, when southerly winds prevail, the water is entirely smooth in every part of the southern side of the bay; but as it is open from the northeastward to northwestward, it becomes unsafe in the winter months, when northerly winds may be expected.

Aspect.—About 5 or 6 miles from Cape Deseada the country rises to abrupt craggy eminences and broken ridges of lofty hills, which extend about 30 miles to the southward and terminate in the Piket Berg Range of mountains.

Kapiteins Kloof, 3,410 feet high, in the Piket Berg range of mountains, is very conspicuous from seaward. From a position 10 miles offshore the Kloof and its range appear as if close over the coast and must not be mistaken for a higher range inland.

The Kloof is a well-defined summit; the highest part of the inland range is bold, its northern face appearing precipitous.

On a southeasterly bearing the Kloof Range appears as two sharp peaks close to one another, the eastern being the lower. To the right of these appears a rounded hill not quite so high, which slopes gradually, then rises again to a moderate height in a gradual slope, and terminates with the appearance of a rounded bluff, which when seen from a distance appears to slope down to the water, the considerable tract of low land between it and the sea not being visible.

Klein Tafel Berg, 1,190 feet high, 11 miles northward of Kapiteins Kloof, appears from seaward to be much closer to the beach than it really is.

It is a conspicuous dark object, being the only hill in the locality, though, as in the Piket Berg Range, there is higher land behind it; some of the hills inland are table topped.

Klein Tafel Berg rises from low land on either side at a steep slope; it is table topped and rather uneven along its summit.

Dangers—**North Blinder or Martin Rock** is a rocky ledge lying in the approach to St. Helena Bay, with from $5\frac{1}{2}$ to 8 fathoms on it, and 21 to 26 fathoms close to all around; it is about 1 mile in extent, as defined by the 10-fathom curve, and the sea breaks on it in a heavy swell. The shoalest part lies $5\frac{1}{2}$ miles 26° from Cape St. Martin.

Britannia Reef is a rocky shoal, situated 3 miles 296° from Cape St. Martin, the highest part of which is visible at low water; within the limit of the 10-fathom line this danger lies east and west $1\frac{1}{2}$ miles long, and a little more than $\frac{1}{2}$ mile broad.

Clearing mark.—Shell Bay Point and Stamp Neus Point in line, bearing 104° , leads northward of this shoal.

The bay.—Although Cape St. Martin is the most western part of the bay, Stamp Neus Point, which lies 3 miles eastward from the cape (and is the northeastern extremity of a peninsula projecting $1\frac{1}{2}$ miles from the coast) is the actual western boundary of the anchorage. Between Cape St. Martin and Shell Bay Point, the northwestern extremity of the above-mentioned peninsula, the land falls back to the southward about 1 mile, forming what is known as Britannia Bay.

There are several farms scattered along the shores of St. Helena Bay, and a good road connects them with Saldanha Bay; the greater part of the way the road is only $\frac{1}{2}$ mile from the beach.

Berg River falls into the sea at the head of St. Helena Bay, nearly 9 miles east-southeastward from Stamp Neus Point. This river passes through some of the richest lands in Cape State, and on its banks are some of the best wine districts, in one of which, the remarkably fertile vale of Drakerstein, is produced two-thirds of the wine supplied to the cape.

The mouth of the river is only 40 yards across and is difficult to make out.

About 1 mile eastward the houses on its banks can be seen, as also a conspicuous flagstaff and the three masts of a hulk lying in the river. The Varkvlei Farm, comprising half a dozen white houses, forms a good mark. For 30 miles the river is tortuous, about 60 yards wide, with depths of from 5 feet to 5 fathoms in it.

Bar.—In 1906 there was a depth of 7 feet on the bar at high water neaps, but subject to change.

Town.—A small settlement and military station, named Steinberg, together with a church, is situated in a little bay about 4 miles to the southward of Stamp Neus Point, and a fishing village also lies along the shore of Stamp Neus Bay, which is about $1\frac{1}{4}$ miles inside the point of the same name.

Landing.—Boats can land on the beach, which is sheltered by a natural breakwater of rocks.

Anchorage.—Vessels may select any position for anchorage, between Stamp Neus Point and the town, in about 6 to 7 fathoms, mud and sand, at the distance of 1 mile offshore. The best anchorage is in 7 fathoms, abreast of the town, with Stamp Neus Point bearing about 311° .

Good anchorage may also be had about 3 miles off the mouth of Berg River in about 5 fathoms, on the line joining the right point of the river and Stamp Neus Point, the latter bearing 299° . This position is well adapted for vessels intending to water from the river.

The anchorage shown on the chart is in about 4 fathoms, $1\frac{1}{2}$ miles northward of the river's mouth.

Tides.—It is high water, full and change, in St. Helena Bay, at 2 h. 30 m.; rise of tide at springs, 6 feet.

Supplies.—The farmers residing on the banks of Berg River are of Dutch extraction, and devote their attention to raising grain, and rearing cattle, horses, and sheep for the Cape Town market. They also produce some wine of a good quality, and a small quantity of brandy. Good mutton may be obtained, but beef may be scarce on account of rinderpest. Vegetables and fruit have to be brought by cart from beyond Piketberg. Wood may be had, but not of a large size.

Water.—Vessels requiring fresh water should anchor off the entrance of Berg River, and send the casks into the river as far as the flood tide will take them, about 5 miles. Here let them remain until nearly the last of the ebb, when they may be easily filled, and the water thus procured will be found to be excellent. The water in the wells at the river's mouth is brackish, and not fit for drinking.

Trade.—There is a large fishing industry, extending up the Berg River, round the shores of St. Helena Bay, and along the coast as far as Saldanha Bay, giving employment to about 1,000 men. There is also a considerable export trade to Cape Town in wine and corn, which is brought down the river in lighters. The dried fish is shipped principally to Mauritius.

Communication.—A small steamer runs to Cape Town weekly. The nearest telegraph office is at Vriedenberg, distant 3 hours by cart. Mails are dispatched via Hopefield to the railway at Malmesbury, distant 11 hours' journey.

General remarks—Soundings.—The plateau of soundings along the portion of the coast comprised between Great Fish Bay and Robben Island has not been sufficiently well surveyed to mark its limits with any great degree of accuracy. All along the coast the breadth of the bank is small, in some places the water is very deep close to the shore, while in others anchorage is impossible. Nevertheless the soundings, as a rule, will be found useful to mark the approach to the coast, and anchorage may be obtained on a bottom composed of sand and mud.

A bank, with a depth of 27 fathoms over it, has been reported (1904) to exist in latitude $25^{\circ} 31'$ south, longitude, $12^{\circ} 55'$ east.

Winds, etc.—The seasons on this part of the coast are not very well defined. In the months of May, June, July, and August rain rarely falls; but during the remaining months of the year rain is occasionally experienced, and sometimes extends over several days, especially between September and March. Throughout nearly the whole year the breezes prevail from south-southwest and south-southeast, and are sometimes very violent. During the months of May, June, July, and August the winds vary from southwest to east-southeast, and generally moderate in force toward sunset. In the bays easterly winds are sometimes experienced during the night, and occasionally light northerly winds.

The south-southwesterly winds which prevail during the day along this line of coast, lose in intensity as the distance from the shore is increased; and about 300 miles off they insensibly become merged in the southeast trades. Occasionally, along this coast an easterly wind is experienced, resembling in its effects the harmattan of the northern hemisphere. It is of frequent occurrence between Port Alexander and the Orange River, and brings with it heat of a most

oppressive character; but the wind is not so violent as the harmattan. The strongest winds off this coast generally come from the east-southeast, and sometimes blow with great force.

The winds will also be found to vary in intensity or direction north or south of the twenty-fifth parallel of latitude, which seems to be their natural limit. For instance, to the northward of this parallel, between it and the Tropic of Capricorn, the winds blow from south-southeast and south, always fresh, and sometimes very much so, throughout the southern winter months; while to the southward of this parallel as far as latitude 33° south, the winds generally blow from south to southwest, and are usually of a more moderate character, though squalls are experienced from east-southeast, and also from north to west-northwest.

Along this coast also is experienced a very dangerous type of squall, which comes on without any of the usual indications attending an increase of wind, and therefore sailing vessels should always be prepared to reduce sail. They are known as white squalls, being in reality whirlwinds, which are rendered all the more formidable as, by the absence of the usual signs, their advent can not be foreseen. The only indication of the approach of these squalls is to be found on the horizon, where the sea, lashed into foam, marks the approach of the coming danger.

Currents.—The currents along this coast generally follow the trend of the shore in a northerly direction, with a velocity of about 1 mile an hour. But sometimes close in to the coast the current has been found setting to the south-southwestward at the rate of 40 miles in 24 hours. These anomalies, however, seldom continued beyond two or three days.

Rollers.—From Cape Negro to the Cape of Good Hope, when the wind falls or a calm ensues, the sea becomes smooth, though the oceanic undulations cause a heavy break on the shore.

There is always a swell along the coast, generally from the south-southwest, which keeps up a constant surf, and the effect of this swell acts as an indraft, against which vessels should carefully guard, as the position of a ship becalmed close inshore is attended with danger. It has been ascertained by actual experiment that during a calm vessels have been set toward the shore by the swell at the rate of $\frac{1}{2}$ mile an hour.

Fogs.—Along this coast fogs of great density are frequently experienced, and therefore during their continuance it is necessary to keep a good offing, for the soundings are not always to be depended upon as marking the approaches to the shore. Generally the fogs are dispersed about 11 a. m.

The refraction along this coast is very remarkable, and is likely to occasion grave errors in estimating the distance from the land.

CHAPTER XIII.

CAPE ST. MARTIN TO CAPE HANGKLIP.

The coast.—From Cape St. Martin to the northern point of Saldanha Bay the distance is 22 miles by the coast, which forms the arc of a circle with its convexity to the westward. The whole extent of this portion of the African Continent, which has a general trend to the southward, is very rugged and deeply indented; but none of the bays afford shelter, as they are all open to the westward, and consequently exposed to the heavy swell of the South Atlantic. There are also numerous off-lying rocks, which are very dangerous.

Great Paternoster Point.—About 2 miles southwestward of Cape St. Martin is Great Paternoster Point, off which a reef of rocks and several small islets extend 1.3 miles to the northwestward; the outer rock is Seal Island. There is also a sunken rock lying 1 mile southward of Seal Island.

Clearing mark.—Cape St. Martin and Shell Bay Point in line bearing 71° clear these dangers.

Cape Columbine or Cape Castle (latitude $32^{\circ} 50' S.$, longitude $17^{\circ} 51' E.$).—At the distance of 6 miles southwestward from Paternoster Point is Cape Columbine or Castle, which derives its name from a peculiarly shaped hill, 228 feet high, surmounting the cape; the intervening coast, falling back 2 miles, forms a bay, but it affords no shelter from westerly winds. Rocky reefs fringe the cape, and extend nearly $\frac{3}{4}$ mile off, the outer one being visible at low water.

Jim Crow Rock, showing 1 foot above high water, is the north-western extremity of a rocky ledge on which the sea breaks in heavy weather, and lies 355° 2.3 miles from the cape; there is 18 fathoms water between the ledge and the before-mentioned rocky reefs. A dangerous shoal with $1\frac{1}{2}$ fathoms water on it lies 217° 1.3 miles from the cape.

Duminy Point.—At the distance of 5 miles southward from Cape Castle is Duminy Point.

Northwest Bay.—The coast between falls back about $1\frac{1}{2}$ miles, and forms Northwest Bay, but this also affords no shelter from the westward.

Dangers.—A rock, which is awash at low water, lies 2 miles 313° from Duminy Point; there is also a dangerous reef, part of which is awash at high water, running off 238° 1.4 miles from the same point. In the center of the bay is a patch of 4 fathoms, 1 mile from the

shore, between which and Duminy Point there are several outlying dangers, about $\frac{1}{2}$ mile from the coast, one of which, about 1 mile northward from the point, is 3 feet high.

Jacob Reef.—From Duminy Point to Fish Point the whole coast is fringed by rocks and foul ground, extending upward of 1 mile offshore; several of the rocks are awash at high water, and the highest part of one called Jacob Reef, situated 3 miles southward from Duminy Point, is 12 feet high.

Danger Bay.—The entrance to this bay, which is semicircular in form, lies between Fish and Long Points, $1\frac{1}{4}$ miles apart, but this is contracted to only 1,200 yards by the rocks which run off southward from Fish Point. As this bay lies open to the westward, and there are several sunken rocks off the entrance, which sometimes break, it must always be dangerous to approach by a stranger, although a small vessel might in case of necessity obtain an anchorage in 3 to 4 fathoms, about $\frac{1}{4}$ mile from the south part of the bay, well sheltered from southwesterly winds.

Cap Rock.—This danger, which uncovers at low water, lies 1,700 yards 330° from Long Point, with 10 to 11 fathoms between it and the sunken rocks off the point.

Clearing mark.—Schooner Rock (22 feet high) off the northern entrance point of Saldanha Bay, and the peak of Jutten Island in line 127° leads just westward of Cap Rock; this mark also clears the dangers off the coast northward of the entrance to Saldanha Bay.

Soundings—Caution.—The greatest care must be exercised when navigating in the vicinity of the above-mentioned dangers, situated between St. Helena and Saldanha Bays, as many of them rise almost precipitous from the bottom, having as much as 18 to 25 fathoms close-to.

At night, a vessel should not go inside a depth of 50 fathoms; this depth will lead 3 to 4 miles outside of all dangers.

Bank.—A sounding of 52 fathoms, coral, was obtained by the British naval vessel *Actæon* in 1862, about 70 miles westward of Saldanha Bay.

Saldanha Bay.—Close to the northern point of this noble bay is Schooner Rock, 22 feet high, and thence to South Head or Stomp Point, on the southern side of the entrance, is 145° 3.8 miles.

Entrance channel.—Within these points the entrance channel, which has hills of from 200 to nearly 400 feet high on either side, runs in for a distance of 3 miles, where it becomes contracted between Houtjes and Eland Points, to $2\frac{1}{2}$ miles, but opens out immediately into an extensive basin 6 miles in length north and south, affording good anchorage on its northern and southern shores.

The bay.—Saldanha Bay from its natural formation is admirably adapted for commercial purposes, and for the easy ingress

of ships requiring to repair damages sustained at sea; indeed, it may be said to be the only safe harbor on this portion of the coast.

It is proposed to increase the facilities of this fine harbor by some scheme of construction of wharves and railways to enable the resources of the fertile country around it to be more fully developed.

The great capabilities of this bay as a harbor were greatly appreciated by the Dutch, who made it a station for their ships of war and a postal rendezvous for their East Indian possessions.

Malagassen Island, about 400 yards in extent, is 26 feet high and lies 1,600 yards eastward of Schooner Rock, and 1,000 yards off the northern shore; the island is surrounded with sunken rocks and should therefore be passed on its southern side at a distance of over 600 yards; there is a 5-fathom patch which sometimes breaks at 400 yards from its southern point.

Passage.—There is a narrow passage of deep water within the island, but this should never be taken, as the bottom is foul and the passage unsafe, especially with the heavy swell always setting in, Barrack Rock and Blink Klip being the principal dangers in it.

Needle Rock, 17 feet high, is 500 yards northeastward of Malagassen Island.

Jutten Island is 119 feet high, about $\frac{1}{2}$ mile long, and lies 2 miles 140° from Malagassen Island, the depths being from 14 to 22 fathoms, sand and shells. This island is conspicuous, having two hills whitened by guano, which from the southwestward appear as one.

Rocks extend more than 400 yards northward from Jutten Island, and fringe it nearly 200 yards off on the other sides.

Passage.—Between Jutten Island and the mainland, the passage is $\frac{1}{2}$ mile wide, with 10 and 11 fathoms water, sand and shells, and both shores may be approached to a little more than 200 yards.

Wasserfall and Lloyd banks.—Wasserfall Bank is a small patch of $9\frac{1}{2}$ fathoms, which breaks in heavy gales, lies a little outside a line joining the two islands, and nearly in the center of the entrance. Lloyd Bank, with 10 fathoms on it, lies 1,000 yards southward of the above.

Marcus Island, 23 feet high and about 400 yards in extent, lies $2\frac{1}{4}$ miles north-northeastward from Jutten Island. Marcus Island is foul for 300 yards off on the northern and 200 yards on the southern side.

Hospital Rock, a small rock 20 feet high, lies off the latter side.

Houtjes and Eland Points.—Both these points are steep-to.

Channel.—The general depths between Marcus Island and Houtjes Point are 9 to 10 fathoms, but nearly in the middle of the passage is Blink Klip Rock with $4\frac{1}{4}$ fathoms on it.

Leading marks.—The mark to proceed between this rock and Houtjes Point is Schooner Rock well open to the northward of Needle Rock 245° .

Barrack Rock, with only 9 feet on it, lies westward of Blink Klip Rock. The above leading mark passes over the position.

North or Baviaan Bay.—This bay lies to the westward of Houtjes Point, and is about 1 mile across, with good shelter from the northwestward. The only danger in entering this bay is the before-mentioned Barrack Rock, lying off its western point, but as Houtjes Bay in its immediate vicinity is much superior in every respect, there is no inducement for vessels to use this bay as an anchorage.

Houtjes Bay is the northern arm of Saldanha Bay, and forms a commodious anchorage, well protected by a rocky promontory terminating at Houtjes Point, the only danger in rounding which is a small rock, drying at low water springs, situated at the distance of 100 yards north-northeastward from the point. The soundings in the bay are regular, from 4 or 5 fathoms, sand and shell, and there is deep water close to the western side of the bay; while the promontory forms a natural pier of granite formation nearly 1 mile in length, where vessels sheltered from all winds may lie in perfect safety in all seasons, and if necessary be hove down without risk of injury.

Piers.—There is a wooden pier 150 feet long belonging to Stephan Bros., close northward of Baviaan Point. It has a depth of 14 feet at its outer end, but it is not sufficiently strong to admit of vessels berthing there.

There is also a small stone jetty with steps for landing.

Railway.—A 30-inch gauge line connects Houtjes Bay with Kalabas Kraal on the main line and thence to Cape Town.

Trains run to Kalabas Kraal on Tuesdays, Thursdays, and Saturdays and to Houtjes Bay on Mondays, Wednesdays, and Fridays. The transit is about 11 hours to Cape Town.

The railway is owned by the Government.

Water.—There is a great scarcity of water in the vicinity of Houtjes Bay, and the Saldanha Bay Harbor & Railway Co. are boring in the hope of finding a good supply. A contract exists between this company and the South African Whaling Co. at Donkerkat Bay for the transport of water from Oesterval to Houtjes Bay, and the whaling company have to keep two lighters and a tug capable of carrying water.

Water is also brought in carts from Berg River.

Trade.—In addition to the farm produce of the district there are two crayfish canneries, the combined annual output being about 1,000 tons. The companies own 20 fishing boats of about 3 tons. A

granite quarry exists near the head of Houtjes Bay, and there is a great quantity of granite and dolomite in the locality.

The guano deposits on Marcus, Jutten, and Malagassen Islands are owned and worked by the Government.

Middle Ground—Buoy.—A red can buoy has been established near the southern end of the Middle Ground. It is moored in a depth of 2 fathoms, 400 yards northeastward from the house on Schapen Island.

The buoy can not be depended on.

Baviaan Point, with rocks extending 600 yards northward and one with 6 feet on it 400 yards eastward from it, is $1\frac{1}{2}$ miles northward of Houtjes Point. Between these two points is a small bay called the Hole.

Village.—The village is situated on the northeastern side of Baviaan Point; it has a population of about 250 persons. There is a good hotel, and a crayfish canning factory.

Anchorage.—A good position in about 5 fathoms water will be found about $\frac{1}{2}$ mile from Houtjes Point, with Marcus Island just open. Vessels of light draft may anchor much closer in.

Seven Blinders Reef, in the northeastern corner of the bay, is a small patch of rocks awash at high water, lying 1.4 miles northeastward from Houtjes Point; there are $3\frac{3}{4}$ fathoms close to all round, but there is a small patch of rock with 3 fathoms on it 500 yards southeastward of it.

Lynch Blinder Rock.—This rock, which uncovers at low water springs, and is always breaking, lies about $2\frac{3}{4}$ miles 106° from Houtjes Point, and 1,800 yards westward of Lynch Point. The passage between the rock and the main shore is rather less than $\frac{3}{4}$ mile in width, with from 7 to 4 fathoms water.

Clearing mark.—Constable Hill, in line with the western extremity of Schapen Island, 175° , leads westward of Lynch Blinder Rock.

Middle Ground is a shoal with from 3 to 6 feet water, and extends 800 yards in a northerly direction abreast Lange Baan Point.

Schapen Island, 48 feet high, is 800 yards in extent, with a narrow channel on either side.

Meuw Island is small, 23 feet high, and situated $\frac{1}{2}$ mile west-northwestward of Schapen Island.

A rock, which uncovers at low water, lies nearly midway between the southwestern extremities of Schapen and Meuw Islands.

Salamander Point, which is fairly steep-to, having a depth of 3 fathoms about 200 yards off it, is 1 mile northwestward of Meuw Island; between Salamander Point and Camp Point, 1,400 yards to the southward, is Salamander Bay.

Whaling stations.—Hans Ellefsen & Co. have a whaling station in Salamander Bay. They own three whaling steamers of about 100 tons, and can stock 700 tons of coal, generally holding 200 tons in reserve. A ship in urgent need could obtain sufficient coal to take her to Cape Town.

Some 70 tons of fresh water are used daily in connection with the business, the water being obtained from a well at Oesterval; the supply is limited, but the company could supply ships in an emergency.

Vessels go alongside a sunken hulk to discharge coal and take in cargo. There is a depth of 14 feet alongside.

The South African Whaling Co. has a whaling station in Donker-gat Bay (between Camp Point and Meuw Island). It owns 9 steam whaling ships of from 80 to 150 tons, of which 6 vessels go northward in the winter months and work in the vicinity of Lobito Bay. There is practically no reserve stock of coal kept at this company's station. Water is obtained from Oesterval. There is a steam floating factory, but only small repairs can be effected at either station, and the factory ship does not leave the harbor, being unfit to go to sea. Steamers go alongside a floating hulk, which is moored alongside a sunken hulk, to which a pier has been built, to discharge coal and take in oil. There is 14 feet of water alongside.

The whaling ground is from 50 to 130 miles offshore. The hump-back, blue, fin-back, sei (2 varieties), sperm, and right whales are obtained, and are given in the order of frequency.

Mooring buoys.—There are two mooring buoys in Salamander and Donker-gat Bays, for the use of whaling vessels.

Current.—The current appears to set fairly in and out of the entrance to Saldanha Bay, at the rate of about 1 mile an hour, but a short distance outside it runs to the northward from $\frac{1}{2}$ to 1 mile an hour. During fresh southerly winds a strong current seems always to run to the northward between Schapen Island and Pofadder Point; to avoid it, boats beating up from the anchorage to the village should keep the western shore.

Winds.—The winds in Saldanha Bay are generally from the south during the months of November and December, from the south-southwest in January and February, from southwest in March and April, from the west-southwest in May and June, and from westward and west-northwest from July to October, inclusive. They then generally return to the southward during November, accompanied by squalls and heavy rains.

Tides.—It is high water, full and change, in Houtjes Bay (Saldanha Bay), at 2 h. 31 m.; springs rise 5 feet, neaps $3\frac{1}{2}$ feet.

Directions.—Vessels intending to enter Saldanha Bay will have no difficulties to contend against after the points of entrance have

been identified, as there are no detached dangers to avoid, and those fringing the islands and points of the mainland will be cleared by keeping the moderate offing which common prudence would dictate. In this, as in all other places along the littoral of the western coast of South Africa, the accuracy of a vessel's latitude is all-important before running for an anchorage; but when certain of the locality steer in midway between Malagassen and Jutten Islands, and, passing to the southward of Marcus Island, select an anchorage either in Houtjes Bay or the southern arm.

The only danger in the channel to the northward of Marcus Island is Blink Klip Rock, but by keeping Houtjes Point bearing 40° until Schooner Rock comes well open northward of Needle Rock 245° and then steering on that line until Houtjes Point bears 1° , a vessel will then be past the rock and may steer in for the anchorage; but for sailing vessels this route is generally avoided, in consequence of the wind frequently falling light and the constant heavy swell which sets a vessel toward the shores of North Bay; therefore for them it is advisable always to pass to the southward of Marcus Island. If intending to anchor in Houtjes Bay, round Houtjes Point at the distance of 400 yards, avoiding the sunken rock off it, and come-to in the anchorage.

Vessels intending to anchor in the southern arm of Saldanha Bay should pass Eland Point at a convenient distance, and take up anchorage in 5 to 6 fathoms off Salamander Point, as given below.

In running for Saldanha Bay during the night, or in thick weather, care should be taken to avoid making the land to the northward of the place, as numerous sunken rocks exist between the northern point of the bay and St. Helena Bay.

When leaving Saldanha Bay in a sailing vessel it is better to weigh at sunrise, when the breeze is moderately fresh, and care should be taken always to pass to the southward of Marcus and Malagassen Islands for reasons already given. After passing Marcus Island, keep on the southward side of the entrance; a better position will thus be maintained in the event of the wind falling light, as the swell sets toward the northern shore.

Anchorage.—The best anchorage on the southern part of Saldanha Bay is in from 5 to 6 fathoms $\frac{1}{2}$ mile eastward of Salamander Point, and with the western point of Meuw Island 81° open of Camp Point.

The shelter in the anchorage off Salamander Bay is not so good as in Houtjes Bay. Even with a southwesterly wind the ocean swell penetrates to the ships' anchorage, and during a strong northwesterly wind the swell is at times very heavy. The tide sets strongly in and out of the inlet and frequently holds vessels broadside on to the swell.

Inside the inlet or lagoon, when tide and wind are against one another a nasty sea gets up, but there is excellent shelter for boats and whaling craft in the small bays.

Villages—Pier.—There is a pier and landing place at Pofadder Point, and a good hotel has been built there. Attempts are being made to exploit the locality as a health resort.

Wreck.—The wreck of the hulk *Wilhelmina Cornelia* lies sunk between 400 and 600 yards eastward from the entrance to Salamander Bay, but its exact position has not been reported.

The lagoon.—In the southern part of Saldanha Bay, between Salamander and Lange Baan Points, is the entrance to a shallow inlet known as the lagoon; it recedes about 8 miles southward from Schapen Island, and at its head is a small stream. The breadth of this lagoon varies from 1 to 2 miles. It is encumbered with shoals and sand banks, but there are depths of from 3 to 5 fathoms in the channels. The shores are rocky and backed by hills 400 to 600 feet high, the principal of which are Vlaberg, 630 feet high, which has apparently a rounded summit and a peak close by, and Constable Hill, 616 feet high, on its western side. The navigation of this sheet of water must not be attempted without local assistance.

Villages.—There are several farms and villages on the shores of the lagoon, the most important being Pofadder, on the eastern side of the entrance $\frac{1}{2}$ mile southward of Schapen Island. There is anchorage off this village for small craft.

Communication.—Mails leave twice a week to connect with the railway at Malmesbury, distant 10 hours by road. The post office at the village in Houtjes Bay is connected by telegraph with Cape Town, but not that of Pofadder. There are roads leading to Hopefield, Darling, and Cape Town.

Supplies.—Fresh provisions are plentiful, but notice of requirements should be given a few days beforehand. The islands swarm with rabbits. Plenty of excellent fish may be caught with the seine or hook and line. The best place to haul the seine is in Riet Bay, westward of Schapen Island, where the water is only 6 or 7 feet deep, over a sandy bottom; the other places are generally rocky and foul. Fine crawfish are easily procured in any quantity.

The land around the bay in many places is well cultivated, and there are the usual dwelling houses and farm buildings; wheat, barley, oats, rye, potatoes, vegetables of many sorts, grapes, figs, peaches, etc., all of excellent quality, are raised in great abundance.

Game can be obtained on the hills and on the lowland around the village on Pofadder Point; deer, hares, koran, red-legged partridges, and bush fowl abound.

Water.—Water is scarce; there is, however, a good supply at Oesterval Point, $2\frac{1}{2}$ miles southward of Schapen Island. There is

also a spring at Oud Post House, but the water is shoal off both these places.

Kreeft Bay.—From South Head the coast falls back southeastward about 1 mile, forming Kreeft Bay, in which there is no shelter from the westward.

Stony Head, the southern point of the bay, 2 miles southward of South Head, has a reef of rocks, on which the sea is generally breaking, extending nearly $\frac{1}{2}$ mile off it.

Vondeling Island.—One mile farther to the southward is Vondeling Island, 31 feet high, about 600 yards long, and the same distance offshore. The intervening shore rises to a series of small hills, from 160 to 360 feet high.

The coast.—From Vondeling Island the shore falls back a little to the eastward, and thence the low and sandy shore continues in nearly a straight line for a distance of 14 miles. This part of the coast is safe to approach, having 6 to 9 fathoms not more than $\frac{1}{2}$ mile from the shore.

Caution.—Reports have been made from time to time of currents setting in on this coast. Ships bound from St. Helena have in any case the current on their starboard bow, which would have the effect of setting them in.

Ijzer Fontein Point is a rocky rounded salient point, fringed with a reef of rocks, and having close over it a hill 276 feet high. Meuw Rock is about 1,200 yards northward of it.

Dassen Island.—At the distance of 5 miles southwestward from Ijzer Fontein Point is Dassen Island, about 2 miles in length, with a light near its southern end. The island, though principally covered with sand, is based on rock and is fringed on its north, west, and southern shores by dangerous reefs, some of which extend 1 mile from its coasts.

A remarkable hollow rock, called Spout Rock, lies on the western side of the island. In heavy weather the sea is forced through the orifice to the height of about 100 feet and can plainly be seen over the island from a vessel at anchor on the eastern side.

Light.—A group-flashing light is exhibited on the southern end of Dassen Island, at an elevation of 155 feet above high water and visible 18 miles. The lighthouse is a cylindrical iron structure, 80 feet high, colored red and white in eight horizontal bands, with detached dwellings about 60 yards eastward of it.

Offlying dangers—South rock.—In addition to the reefs extending from the island there are several sunken patches, the outer of which, South Rock, with 5 fathoms on it, is about $1\frac{1}{2}$ miles southward from the southeast end of the island.

Southwest Breakers are two sunken rocks with respectively $5\frac{1}{2}$ and $6\frac{1}{2}$ fathoms (least known depth) at low water, and on which

the sea breaks heavily during and after bad weather, lying 3 miles from the southwestern shore of Dassen Island.

These rocks are northwest and southeast from each other, distant $1\frac{1}{2}$ miles, with deep water between. The western rock, with $5\frac{1}{2}$ fathoms on it, is 3 miles 211° from Dassen Lighthouse. It is steep-to on the western side, 20 fathoms having been found at a distance of 200 yards. On its eastern side the bottom is very irregular for nearly 1 mile, the depths varying from 10 to 20 fathoms, causing a confused and dangerous sea in bad weather.

The eastern rock, situated 3.4 miles 191° from Dassen Lighthouse, has $6\frac{1}{2}$ fathoms on the shoalest part and has depths exceeding 20 fathoms at 200 yards distance all around.

Waterloo Bay—Anchorage.—The eastern side of the island is clear of danger, and good anchorage may be obtained about 800 to 1,000 yards offshore, abreast the middle of the island, in from 10 to 14 fathoms, sand and mud.

The channel between the island and Ijzer Fontein Point is safe, care being taken to avoid Rondeberg Breaker, hereafter described.

Bank.—The reefs westward of Dassen Island are steep-to, there being from 20 to 26 fathoms close outside the breakers, with 40 fathoms about 5 miles off, and 90 fathoms at the distance of 10 miles from the island. This bank of soundings, which extends between Saldanha and Table Bays, may be of service to vessels beating along the coast. Although a vessel should be able to ascertain her position by bearings of Dassen Island Light, it is necessary to exercise great caution when in the vicinity of that island, especially at night, as the reef is steep-to, and the position of the rocks not always marked by breakers. It is better not to go inside a depth of 45 fathoms.

Currents.—Between Saldanha and Table bays, in the winter months (June, July, and August), an eddy current sets to the southward at the distance of 4 or 5 miles offshore; a little outside this the current is constant, and its general direction is to the northward (or parallel to the coast), at the rate of $\frac{1}{2}$ to 1 knot an hour, but between Table Bay and Dassen Island it will sometimes attain a velocity of more than 2 knots an hour. This current has a tendency to set a vessel toward the coast, especially during and after strong onshore winds, and should be carefully guarded against.

Caution.—Reports have been made from time to time of currents setting in on the coast between Saldanha Bay and Slang-kop Point (on the Cape Peninsula). Ships bound from St. Helena, have in any case the current on their starboard bow, which would have the effect of setting them in.

The coast.—From Ijzer Fontein Point the coast trends in a southerly direction for $15\frac{1}{2}$ miles to Bok Point; it is sandy, and forms an open bay, but without shelter.

About 11 miles from Ijzer Fontein Point are the Black Rocks, two small islets close to the shore, and near to the northward is the mouth of a small stream known as the Modder River.

There are 8 to 10 fathoms water nearly 1 mile from the shore all around this bay.

Bok Point, which lies 125° 13.6 miles from Dassen Island Light, is rocky, with a fringe reef and a rock which sometimes breaks 1 mile northwestward from it, and with numerous little hills a short distance inland.

Aspect.—At 11 miles eastward of Bok Point the hills attain the height of 1,852 feet in Mamre Berg, with Kapoc Berg, 1,500 feet high, to the northward, and Dassen Berg, 1,368 feet high, to the southward.

Ronde Berg Breaker is a dangerous sunken patch of $4\frac{1}{2}$ fathoms 2 miles off the shore and 7 miles northward of Bok Point. There are 18 to 20 fathoms close outside this danger and 12 to 17 fathoms between it and the breakers about 1 mile distant, which here project a little farther out than in the other part of the bay.

Matroos Point is situated about $4\frac{1}{2}$ miles southeastward from Bok Point. It is 181 feet high, and has rocks 800 yards off its northern point.

Between these points the land falls back to the eastward more than 1 mile, forming two bays separated from each other by a rocky tongue of land fringed by a reef. The Buffels River falls into the southern part of the northern bay. The southern one, known as Matroos Bay, being open to southwest winds, affords no shelter from that quarter and is seldom used as an anchorage.

The coast.—From Matroos Point the low and sandy coast trends southward to Melkbosch Point, $7\frac{1}{2}$ miles distant. The soundings are very regular along this shore, having 7 to 11 fathoms 1 mile off. About 2 miles southward of Matroos Point are the Seal Ledges, a reef of rocks awash and extending $\frac{1}{2}$ mile offshore. There are submerged patches of rock at this distance from the coast, continuing for 1 mile both to the northward and southward of the Seal Ledges. This part of the coast is of moderate height, barren and sandy near the sea, but the interior seems of better soil.

Robben Island.—This island lies $25\frac{1}{4}$ miles southward of Dassen Island and 5 miles northward of Green Point, the northern extremity of the Cape Peninsula, and, with its light, forms an admirable landmark for the northern approach to Table Bay. It is low, flat, nearly 2 miles in length in a north and south direction, with a breadth of 1 mile. The island is fringed by reefs, which project about 200 yards off its western side, but rocky ground, with from 5 to 11 fathoms over it, extends in a westerly direction 1 mile from

its western extremity, and on which the sea breaks heavily during strong onshore winds. This rocky ground rises suddenly from depths of 25 and 30 fathoms.

The northeastern side of the island is free from danger, but the eastern and southern shores are fronted by rocky ground, with irregular depths of 2 to 4 fathoms, and marked by seaweed to the distance of 600 to 800 yards. The 5-fathom line of soundings on the eastern and southern sides is distant 800 to 1,400 yards from the shore.

Light.—An occulting white light is exhibited from Robben Island. It is elevated 154 feet and visible 18 miles and shown from a white cylindrical tower 60 feet high, erected on Minto Hill, the summit of the island.

Fogsignal.—An explosive fogsignal is given near the lighthouse during thick or foggy weather.

Jetty light.—A fixed white light, elevated 15 feet, and visible 4 miles, has been established at the head of the jetty on the southeastern side of Robben Island.

Signal station.—The signal station at Robben Island communicates by heliostat with Cape Town.

Whale Rock, with a depth of about 6 feet, marked by seaweed, and upon which the sea usually breaks, lies 1.3 miles from Robben Island Lighthouse. Between the rock and Robben Island there is a passage nearly $\frac{3}{4}$ mile wide, with depths varying from $3\frac{1}{4}$ to 7 fathoms, over rocky ground; but this channel should never be attempted by sailing vessels, except in case of emergency, as the currents are sometimes strong and uncertain in their direction about the rock.

Robben Anchorage.—On the northeastern side of Robben Island there is fair anchorage, sheltered from winds between southwest and west-northwest. The best position for a large vessel is with Whale Rock Breaker, open eastward of the southern point of the island, bearing 198° , and the northern extremity of the island 293° , in 7 or 8 fathoms water. sandy bottom. Smaller vessels will find excellent shelter nearer the island in 5 and 6 fathoms. Closer to the shore than this the ground is rocky.

Landing.—There is a jetty on the southeastern side of the island for the convenience of communication with the leper establishment, and there is also good landing on the northeastern side in Murray Bay.

Blaauwberk (Blue Hill) is a dark round hill rising to an elevation of 745 feet at $1\frac{1}{4}$ miles inshore on the mainland opposite Robben Island. It bears 53° nearly $5\frac{3}{4}$ miles from Robben Island Lighthouse, and may be considered the northern boundary of the approach to Table Bay.

The channel between the shore under Blaauwberg and Robben Island is $3\frac{1}{2}$ miles wide, but the narrowest part, between the depths of 7 fathoms off the mainland (within which no vessel should venture) and the 5-fathom line off the island, is about 2.3 miles wide, with soundings of from 7 to 10 fathoms.

Table Bay (called originally Saldanha Bay, after the Portuguese captain who discovered it in 1503) is an indentation on the northern side of the neck of the Cape Peninsula, about 4 miles wide at its entrance between Whale Rock and Green Point, and affords anchorage for a large number of vessels, with fair security in the summer months, October to April. Victoria Basin can accommodate large vessels.

The eastern shore.—Southward of Blaauwberg the shore for 2 miles is composed of a number of white sand hills from 100 to 200 feet high, off which are rocks and breakers which in the southern part extend 800 yards offshore; from thence the coast gradually curves for 8 miles to the mouth of Salt River, forming the eastern shore of Table Bay. The whole of this coast is very deceptive to vessels standing into the bay at night or in hazy weather, from the close resemblance the sand bears to the water.

From Salt River the coast sweeps to the westward and northward, fronting Cape Town, and forming Table Bay anchorage.

Aspect.—The Tygerberg Hills, 1,357 feet high and 6 miles in length, extend 5 miles in a north and south direction within the eastern shore of Table Bay. With the exception of Blaauwberg, these are the only elevations in the neighborhood of Table Bay northward of Table Mountain.

Salt River.—The mouth of Salt River is fordable in summer, but dangerous in winter, when it becomes an extensive quicksand. Another winter mouth of the river lies about 2 miles northeastward; the coast between these mouths is fronted by foul ground, with depths of 3 to 5 fathoms water, to the distance of more than $\frac{1}{2}$ mile from the shore, and on which the sea breaks after heavy northwesterly gales; with this exception the water shoals regularly from 8 fathoms to the sandy beach between Blaauwberg and Salt River.

The Cape Peninsula—Aspect.—This tract of land is a remarkable promontory, extending about 28 miles in a north and south direction and from 5 to 8 miles in breadth, with a height varying from 3,550 feet at Table Mountain and 3,200 feet at Constantia Berg to but a few feet above the sea between Fish Hook Bay on the east and Chapman Bay on the west, which low land, however, is only visible on certain bearings. The neck of land connecting the peninsula on its northeastern side with the mainland and extending from Table Bay to the head of False Bay is low and about 11 miles across.

The Cape Peninsula is rocky and barren, with a stunted growth of trees here and there; the fertile valleys, however, in the vicinity of Constantia and Wynberg are pleasing exceptions. From the westward the peninsula appears high and rugged from Table Mountain to within 4 miles of the Cape of Good Hope, where the mountain chain terminates at Paulsberg, which stands over the northern extremity of Buffals Bay, on the eastern side of the peninsula. From Paulsberg to Cape Point the land is elevated and even, with the exception of two peaks at its southern extremity, which at a considerable distance make like a saddle island.

Table Bay (continued)—Table Mountain.—The bay derives its name from Table Mountain, a remarkable and gigantic mass of quartzose sandstone, rising to an elevation of 3,550 feet at the southern part of the bay immediately over Cape Town. The mountain, which rests on a granite base 500 feet about the sea, is level on the top, and falls nearly perpendicularly at the east end, until it joins Devils Peak, which is a rugged-peaked mountain, 3,270 feet high, and separated from the former by a gap. On the eastern side of Table Mountain and Devils Peak lies the low sandy isthmus between Table and False Bays. The western end of Table Mountain is also nearly perpendicular from its summit to a considerable distance, and is then united by an abrupt declivity with the base of a conical mountain named Lions Head, which is about 2,180 feet high, and is in some places so steep that it can only be ascended by steps cut in the rock.

Lions Rump.—From the northern side of the Lions Head a rounded ridge extends to the northeastward, where it reaches an elevation of 1,150 feet, and is known as Lions Rump, upon which is a signal station.

Green Point Light.—A flashing white light, elevated 65 feet, visible 13 miles, is exhibited from a square building, 52 feet high, 400 yards within the low-water line of Green Point, the western extremity of Table Bay.

Submarine fog bell.—A submarine fog bell has been established at a distance of 1,250 yards 350° from Green Point Lighthouse.

Mouille Point is situated 1,400 yards eastward of Green Point.

Western shore.—From Mouille Point the coast turns abruptly to the southward, forming the western shore of Table Bay. The docks, city, and anchorage, as described below, are situated on this side of the bay.

The breakwater projects from the coast at a point situated about 1,000 yards southeastward of Mouille Point, and is 3,640 feet in length, a quay wall on the inside running parallel to it, with transverse jetties, named No. 1 jetty, 600 feet in length and a depth of 18 to 20 feet alongside; No. 2 coaling jetty, 500 feet in length and 25 to

28 feet alongside; No. 3 jetty, with a flagstaff on its extremity, is 600 feet in length and 30 feet alongside; and East Pier, 850 feet in length and 500 feet seaward of the No. 3 jetty, with 36 feet alongside.

The railway serves all the jetties. The extension of the breakwater for a farther distance of 1,050 feet in a 73° direction has been sanctioned.

Notwithstanding the severe gales which occur annually, there have been no casualties since the breakwater reached its first stage of completion in 1893.

Light.—An occulting red light, elevated 44 feet and visible 7 miles from 116° , through south, to 341° , is exhibited from a tower 34 feet high, painted in red and white bands, erected on the present completed head of the breakwater. A fog-bell is sounded from the light station at the head of the breakwater.

The South Pier, about 1,650 feet southward of and parallel to the breakwater, is 2,060 feet long, with an elbow 600 feet in length to the northward.

Dredging is in progress to complete a depth of 27 feet at low water spring tides along the northern side of the South Pier; it is proposed to extend its southern side.

Between the South Pier and the entrance to the Alfred Docks is No. 4 jetty, with a depth of from 17 to 23 feet alongside, running parallel with the pier for a distance of 750 feet, for colliers to discharge. Between No. 4 jetty and South Jetty there is a barge jetty, 250 feet long, where coal can be shipped.

Victoria Basin.—This basin is the space included between the breakwater and East Pier and South Pier and its elbow, the entrance being 250 feet in width and the area $6\frac{1}{2}$ acres.

The total length of berthage is about $2\frac{1}{4}$ miles. The whole basin is lighted by electricity. There is a plentiful supply of good water obtainable at the quays.

The depths vary from 35 feet in the entrance to 20 feet as far in as the No. 1 jetty.

Lights.—Two vertical fixed green lights are exhibited on the East Pier on the northern side of the entrance, and two fixed red lights on the elbow on the southern side of the entrance.

Mooring buoys have been placed for the convenience of warping and there is one placed 120 yards eastward of the elbow of the South Pier for vessels securing to its eastern side.

The Alfred wet docks.—The entrance to these docks is on the western side of Victoria Basin. These docks are 1,000 feet in length, 400 to 450 feet in breadth for two-thirds of their length from the north quay, the remaining portion being 250 feet in breadth; the width of the entrance is 100 feet. Extensive warehouses, and with sheds, cranes, etc., are erected around the basin, and a large smithy

and factory are available for engine repairs. The basins are connected by a railway with Cape Town.

Depths.—The depth in the entrance is 21 feet at low water. Inside, the dock has a depth of 24 feet over the northern part, decreasing to 20 and 19 feet in the southern.

Those wishing to enter must first communicate with the harbor master, who will supply them with a copy of the dock regulations.

Dry dock.—The Robinson dry dock is situated at the northwest angle of the inner basin, carries 26 feet over the sill, and has a length over all of 533 feet.

The caisson can be placed in an inner groove, thus forming a dry dock 274½ feet in length, leaving the outer portion for use as a wet dock.

There is also a patent slip at the southern end of the Alfred Dock 184 feet in length on the cradle, with a width of 50 feet, and a depth of 22 feet on lower end of cradle at high water ordinary springs. This slip has a capacity of 1,000 tons.

Harbor works.—A reclamation wall runs some 350 yards southward from the inner end of South Pier, and several smaller jetties project from the shore between South Pier and the castle in the order following: Jetty for landing explosives, ice factory jetty, boating jetty, jetty (unnamed), fish jetty adjoining the fish market, and Central Jetty off Adderley Street. The reclamation in connection with the proposed new basin will, however, cover this portion of the shore. It is proposed to construct a new basin to the southward of Victoria Basin.

Harbor limits—Regulations.—The limits of the harbor are shown on plan 2385. The area within these limits is under the control of the harbor master. The board of trade regulations for lights carried by vessels that anchor or under way must be adhered to. There are also local regulations for the prevention and extinction of fire; but information concerning these matters must be obtained on the spot.

Until further notice the following regulations are to be observed by all merchant shipping including barges, boats, and private vessels moving within the limits of the port of Table Bay:

1. For the purposes of these regulations the limits of the port of Table Bay are as follows: Westward, a straight line between Green Point and Robben Island Lighthouses; and northward, a straight line from Robben Island Lighthouse 90° to the eastern shore of Table Bay.

2. No merchant vessel of any description will be allowed to pass beyond the examination anchorage (see par. 5) without permission from the examining officer, who will be on board the examination steamer. This officer will communicate with all craft desirous of

entering the port, and will give each vessel orders, which are to be rigidly observed, so long as she is within the limits of the port. Any infringement of these orders will render such ship liable to be fired upon immediately.

3. The examination steamer will be distinguished as follows: By day—A blue ensign, and at the foremast head the special pilot flag (a square flag, white and red horizontal surrounded by blue border).

When the port is closed she will hoist three red balls in addition.

By night—Three lights vertically, 6 feet apart, conspicuously displayed at the yard arm so as to show an unbroken light around the horizon. When the port is closed these lights will be red; when it is open they will be white. The above lights will be carried in addition to the ordinary navigation lights, and will be displayed in such a manner as not to be confused with the masthead light.

4. It is to be clearly understood that the examining officer has authority over the movements of all vessels in the port and its vicinity, and disobedience to his orders on the part of masters will render their vessels liable to be treated as hostile, and themselves to prosecution.

5. The examination anchorage is the area inclosed by lines joining the points fixed by the following bearings: (1) Breakwater Light, 183° ; Green Point Light, 214° . (2) Breakwater Light, 150° ; Green Point Light, 214° . (3) Breakwater Light, 150° ; Green Point Light, 240° . (4) Breakwater Light, 183° ; Green Point Light, 240° .

6. An incoming vessel must anchor within this area until boarded, or given orders by the examining officer. The line beyond which an incoming vessel may not pass is with Green Point Lighthouse bearing 240° .

7. Incoming merchant vessels will be admitted to the examination anchorage at all times during the day and night. If coming in by day they are to fly their national colors and company's house flag; if at night, they are to display regulation lights.

8. Vessels at anchor within the port are to display the regulation lights.

9. The port of Table Bay, other than the examination anchorage, will be closed when circumstances so demand.

10. The signal indicating that the port is closed will be three red vertical balls by day and three red vertical lights by night, hoisted on a staff at a point on the shore approximately midway between Mouille Point Lighthouse and Green Point Lighthouse.

11. Pilotage is not compulsory, but the examining officer will provide pilots if required.

12. With the exception of vessels obliged to shift billet through stress of weather or accident, which may do so upon hoisting the international signal for ships in distress, no vessel may move at any

time without giving at least two hours' notice to the examination officer at the port offices, Cape Town Docks.

No vessel will be allowed to leave the port without permission.

13. Agents of vessels expected to arrive are to give the utmost possible notice to the examination office, together with any particulars that will facilitate identification. Agents should advise shipowners that they should, unless special circumstances prevent, time the arrival of their vessels to take place in daylight.

14. No small local traffic will be permitted on the water at night or in a fog. This precludes the use of ships' boats.

15. Should any small craft be seen moving under such circumstances they will be fired upon.

16. As these regulations direct that no small craft or other vessel may move within the port of Table Bay at night, fishing boats must clearly understand that they will be fired upon if they move anywhere at night within the limits of the port.

Time signal.—From a staff near the port captain's residence, 130 yards northward of the graving dock gates, a ball, 36 feet above the ground and 47 feet above high water, is dropped by electricity from the Cape Observatory at 0 h. 0 m. 0 s. mean time of thirtieth meridian of east longitude, corresponding to 10 h. 0 m. 0 s. Greenwich mean time.

A gun is also fired by electricity from the observatory, at the same instant, from Signal Hill Battery.

The Cape Observatory is situated in latitude $33^{\circ} 56' 3''$ south, longitude $18^{\circ} 28' 41''$ east.

A clock on the ground floor of the clock tower at the docks is electrically controlled from the observatory. If the clock is correct the galvanometer on its face should show no deflection at the fiftieth and sixtieth seconds. Before comparing any timepiece it should be ascertained that the clock is correct.

Signal station.—There is a signal station on the Lion's Rump, west side of Table Bay, connected with the telegraph systems of the Province of the Cape of Good Hope.

Cape Town, the capital of the State, and the seat of legislature for the Union of South Africa, stands on the western shore of Table Bay, between it and the foot of Table Mountain; it is well laid out with numerous public buildings, schools, churches, hospitals, and several good squares. It is connected with the principal places in the State by railway and telegraph.

The United States is represented by a consul general.

Population.—In 1911 the white population of the city numbered 29,863.

Supplies of all descriptions can be obtained at Cape Town. Water tanks for the convenience of shipping will be brought along-

side at a moderate charge. There is a plentiful supply of good water laid on to the quays, but it is sometimes scarce in February and March.

Tugs.—There are several tugs available at the port; one, a new and powerful twin-screw tug used for taking vessels in and out of the harbor, is also fitted as a fire float, and has electric searchlights.

Coal is to be obtained in abundance at the coaling jetty. It is usually put on board at the rate of 30 to 40 tons an hour. About 40,000 tons are kept in stock, also some liquid fuel. There are 22 lighters, from 20 to 500 tons capacity, and one of 1,000 tons. Strong southeasterly winds in summer impede coaling.

Repairs to engines and boilers of all classes of vessels are undertaken by the various firms of engineers. There are no heavy forging facilities, but shafts of 40 feet in length and 18 inches in diameter can be turned, cylinders of 25 inches diameter bored, and castings of 5 tons made; there is a steam hammer of 10 tons, and also several of 15 hundredweight and less.

In Victoria Basin, westward of No. 2 coaling jetty, there are sheers capable of lifting 50 tons, with a depth of about 25 feet alongside under them at low water springs, and a 4-ton crane at the inner end of No. 1 jetty. There is a 10-ton crane on the North Quay, Alfred Docks.

Communication—By telegraph with all parts.—Mails weekly from England by Union-Castle Line and other steamers.

Anchorage.—Between April and September, the winter months, all vessels anchoring in the bay must do so under the shelter of the breakwater, southward of Victoria Basin entrance, at a safe distance from the jetties. See Port Regulations, a copy of which is given to every vessel on arrival. It is recommended that vessels be kept as snug aloft as possible, and have a good spring in readiness for use in the event of heavy weather.

Vessels should moor with long scopes of chain. The best ground tackle is required in the winter season when northwesterly and northerly winds prevail, and during gales, precaution should be taken to prevent surging ahead and slacking the chain between the gusts.

Vessels touching for water and other supplies may ride at single anchor.

The examination anchorage is now situated to the northward of Mouille Point, nearly triangular in shape, with the apex lying 1.7 miles 340° from the point, and the sides running from that position toward Green Point Lighthouse and the Breakwater Lighthouse, respectively.

Telegraph cable buoy.—This buoy is moored about 1,000 yards northward of Fort Knockle.

Tides.—It is high water, full and change, in Table Bay at 2 h. 40 m.; springs rise 5 feet, neaps $3\frac{1}{2}$ feet. The duration of slack at high water varies considerably, and greatly depends on the prevailing wind; the water is never stationary more than 30 minutes, and frequently it begins to fall immediately on reaching high water. There is no sensible stream of tide, either in the bay or on the adjacent coast.

Current.—A current varying in strength from $\frac{1}{2}$ knot to 2 or 3 knots, sets to the northward past Table Bay and Robben Island, but during the winter months, when northwesterly winds prevail, a current sets into Table Bay from the northwest, and impinging on the southeastern shore of the bay, about Salt River, divides into two streams, the one setting northward along the coast and out between Robben Island and the mainland at Blaauwberg, while the other takes a westerly course as far as Cape Town Castle, then northerly, sweeping the southwestern shore of the bay, and carrying away loose soil from the southern sides of the jetties and projecting rocky points.

During the summer season it has been observed, particularly during southeasters, that a gentle stream sets round Mouille Point southeastward into the bay, and out by the Blaauwberg Beach, as in the winter. The rocks about the beach from Green Point to Amsterdam Battery are bare, and always free from sand, but at the head of the bay, from the Castle to Salt River vast quantities of sand and seaweed are removed from the beach by the drawback of the rollers, and carried away by the current, leaving the seashore a platform of solid rock, which is again covered up to the depth of 2 to 3 feet during the summer months.

Port Signals.—The following signals will be shown from the Portoffice for the information of vessels in the anchorage, when, from local experience, and the indications of the barometer, a severe gale may be expected.

It is strongly recommended that signals made from the Portoffice may be promptly attended to; and any neglect in the observance of them will be reported to the agents for Lloyds, as also to the owners of the vessels disregarding the same.

| Signal. | Signification. |
|---|--|
| White pierced blue over union jack. | Clear hawse, and prepare to veer cable. |
| Union jack, over white pierced blue. | Veer to a whole cable, and see the third anchor clear. |
| Blue, white, blue, horizontal, over union jack. | Down topgallant yards and masts, and point yards to the wind, and see everything clear for working the ship as far as practicable. |
| Union jack over white and red, vertical. | Shorten in cable to same scope as when first moored. |

The signals will be repeated at the Lions Rump signal station.

When it is considered necessary to make any of the above signals it is strongly recommended that all commanders immediately repair on board their respective vessels, and that the above signals may be answered by hoisting the answering pendant or the ensign at the peak or at any of the mastheads.

Mariners can make their wishes known to their agents in bad weather through the Portoffice by the International Code of Signals, and any assistance required will be strictly attended to as far as practicable.

The following signals may be made from the most convenient point of the shore to vessels that may be stranded.

In daytime a number will be shown white upon a black ground. At night the number will be shown transparent.

No. 1.—You are earnestly requested to remain on board until assistance is sent; there is no danger to life.

No. 2.—Send a line on shore by cask, and look out for line from rocket or mortar.

No. 3.—Secure the rope; bend a warp or hawser to it, for us to haul on shore for the boat, or for us to send you a stout rope, to be made fast to some firm part of the wreck, that we may haul off a boat for bringing you on shore.

No. 4.—Lifeboat will communicate at low water, or as soon as practicable.

No. 5.—Have good lines ready for lifeboat, and prepare to leave your vessel; no baggage will be allowed in the lifeboat.

Answering signals.—By day: A man to stand at the most conspicuous part of the vessel and wave his hat three times over his head.

By night: A light to be shown over the side of the vessel, where it can be best seen by those on shore.

Life saving.—There is a rocket apparatus at the Castle in charge of the Royal Garrison Artillery, also rocket apparatus and lifeboat at the docks in charge of the Harbor branch of the railway department.

Directions—Day.—No special directions are required for steamers entering or leaving Table Bay in the daytime.

Sailing vessels during the Cape summer months should shorten sail before hauling in for Green Point, as southeasters blow hard at times on opening the bay.

If it is found to be blowing hard after passing Mouille Point, vessels may with advantage anchor in 10 or 12 fathoms, where they will be in a good position for dropping into the inner anchorage on the following morning, as the wind invariably falls light there dur-

ing the night, although the southeast wind may continue to blow hard on the east side of the bay.

If compelled by a southeaster to bear up from Green Point in order to seek shelter under Robben Island, take care to avoid the Whale Rock, and anchor on the northeastern side of that island, approaching under easy sail. With ordinary precautions there is little probability of a vessel losing an anchor in bringing up in this place of shelter; but should she part in trying to do so during a southeaster, there is an open sea to leeward. Tugs are available.

During daylight, vessels may round Green and Mouille Points at $\frac{1}{2}$ mile distant, in not less than 10 fathoms water, but this distance must not be judged by the eye, as the points are low and deceptive; thence proceed to the anchorage of the harbor, passing the breakwater at a prudent distance, but giving it a wide berth in bad weather.

Caution.—From neglecting the precaution of using the lead, vessels have sailed on Green and Mouille Points without seeing land, while their masts were observed over a fog from the elevated ground at the foot of Lions Rump. The fogs that obscure the lights are frequently confined to the low ground in the vicinity of Green and Mouille Points, extending upward only 100 to 150 feet. Under these circumstances it is advisable to send a masthead man aloft, who will probably see land when it is invisible from the deck.

At night.—In order to avoid all danger between the Cape of Good Hope and Table Bay, vessels bound for Table Bay from the southward should not shut in Cape Point Light with the land at Slangkop Point, until the occulting white light on Robben Island bears 23° , when it may be steered for on that bearing. This light will be seen before the flashing white light on Green Point. When Green Point Light bears 63° , course may be altered to pass at least $1\frac{1}{4}$ miles northward of that and Mouille Point. From this position the anchorage southeastward of the breakwater can be steered for, taking care to give the occulting red light on the breakwater a berth of at least 600 yards on account of the proposed extension. When past it a vessel may anchor in 6 fathoms water, partly sheltered by the breakwater, or proceed into Victoria Basin.

Vessels bound to Table Bay from the northward should pass about 2 miles westward of Robben Island Light, and then steer for the breakwater light (occulting red), bearing 132° (which will lead nearly $1\frac{1}{2}$ miles westward of Whale Rock), and around the breakwater at the distance above named. The channel between Robben Island and the mainland is not recommended for a sailing vessel on account of the northerly (adverse) current.

Leaving Table Bay.—Vessels leaving Table Bay and bound to the northward should pass between Robben Island and the mainland.

An almost continuous current sets to the northward through this channel, and during the summer months a fresh southeaster frequently blows, while a few miles to the westward of the island the wind is light and baffling, or fails altogether. Vessels bound to the southward should reverse the directions previously given for entering the bay.

Winds—During summer (October to April) the prevailing winds in Table Bay are from the southeastward; these, although known by the name of "southeasters," blow at about southeast by south, frequently with violence during the summer season, and more or less in every season of the year, generally bringing settled weather.

Regular sea breezes from southwestward and west prevail in the mornings, and continue until noon or longer, succeeded by the southeasterly winds from the land.

Northwesterly gales are experienced here in every season of the year, but as a rule these do not blow home between November and May, during which months the bay is considered safe.

The ordinary indications of a southeaster are well marked—a high barometer, a clear sky, and the cloud cap on Table Mountain known as the "table cloth." During the hardest southeasters the Blauw Berg and Hottentot Mountains are obscured by mist, and often after the "cloth" has disappeared the gale continues until these mountain ranges are clear. In autumn, during southeast gales, the top of Table Mountain is sometimes quite clear (such a gale is called a "blind southeaster"), but the Blauw Berg and Hottentot Holland Ranges are covered in mist 24 hours or more before the breeze springs up, by which sign it may thus be confidently foretold; moreover, the wind does not die away until these mountains are clear.

In autumn the southeasters blow at times with great fury over Table and Devil Mountains, and through the gap between them, driving the white clouds in rolling fleeces like wool over the perpendicular sides of the mountain. On these occasions vessels not well moored are liable to drive, and bring both anchors ahead. There have been instances of sailing vessels being driven from Table Bay by these southeasters with all their anchors down, and not regaining the anchorage for five or six days. Sometimes there occurs a fall of the barometer while such a gale is blowing, when a change of wind to the northward may be expected; if this does not come, a black southeaster ensues. Sometimes a black southeaster follows a sudden change of wind from the northward.

The so-called "black southeaster" is distinguished from the regular southeaster by the nimbus or rain tint of the cloud on Table Mountain. It is frequently accompanied by light rain and cold weather. Black southeasters are very destructive to the vines and

to young vegetation, their appearance the next day being as if withered by frost.

During winter (April to October) west-northwesterly winds prevail, and the bay is not so safe. A mountainous sea is thrown into the bay by some of these gales, and before the breakwater and docks were built there was not the slightest shelter.

Westerly and south-southwesterly winds blow strong, and are often accompanied with fogs, rain, and cloudy weather, and with the south-southwest wind hailstorms are frequent; but the west-northwest winds are most violent in those months, often blowing in severe storms from north-northwest or northwest, for several days, with a cloudy sky, and sometimes accompanied with rain. These northwesterly gales are preceded by a gradually falling barometer, with the wind northward, the temperature increasing to an unusual height 36 hours or more before their advent, and with cirrus clouds in the northwest. Table Mountain and the adjacent high land becomes enveloped in clouds. The duration of a northwester is from 2 to 10 days. Northeasterly winds are less frequent than any other, and never continue for any length of time.

Fogs.—In calm weather low fogs occasionally occur, particularly in autumn and winter, the tops of the mountains and high hills being visible above the fog, which is afterwards dispersed by the heat of the sun.

Climate.—The climate is equable, the mean temperature ranging from 69° F. in January to 54° F. in July, the mean daily range being 10°. The winter months are the most humid.

Rainfall.—The mean annual rainfall is 24.1 inches, the greatest fall (4.65 inches) taking place in June, and the least (0.6 inch) in December.

The Cape Peninsula—Coast.—The distance from Green Point to the southern extremity of the Cape of Good Hope is about 33 miles, the intervening coastline being rugged and indented, while the outline of the country is also broken and irregular. From Green Point to Duyker Point the distance is about 9½ miles in a southwesterly direction, and along this portion of the coast the water is deep at 1 mile offshore so far as is known (for the coast between Camps Bay and Logies Rock is imperfectly surveyed), but within that distance there are numerous offlying rocks and patches of reef. Sailing vessels navigating in this locality should maintain an offing of 2 or 3 miles, for within these limits the wind is generally light and baffling, from the close proximity of the high land.

Aspect.—From the western end of Table Mountain, a high serrated ridge of mountains, named the Twelve Apostles, extends in a south-southwest direction toward Hout Bay. They present a steep,

precipitous face to seaward, and are terminated by a remarkable conical hill, 1,415 feet high, called Little Lions Head, similar in appearance to the Lions Head, and having at its southern slope a very conspicuous white sandpatch. To the southward of this, about $1\frac{1}{2}$ miles distant, rises Suther Peak, 2,105 feet, a lofty rugged hill which is divided by a saddle ridge from Hangberg Peak, a remarkable hill of considerably less elevation, overhanging and to the westward of Hout Bay.

Dangers—Lions Paws.—Between $2\frac{1}{2}$ and 3 miles southwestward from Green Point Lighthouse and just to the northward of Camps Bay are two clusters of rocks, 900 yards apart, known as the North and South Lions Paws, lying 1,000 and 400 yards, respectively, off-shore, and situated on the edge of the 10-fathom line; these rocks are awash, but with 9 and 6 fathoms close-to. A rock with a depth of less than 6 feet is situated 279° from South Lions Paw, distant 600 yards. Robben Island Lighthouse bearing 13° leads about 1,600 yards westward of the outer danger; and Green Point Lighthouse bearing 63° leads 1,400 yards northward of the Paws. Besides the Lions Paws there are several other straggling rocks along the shore, both north and southward.

The coast.—From Camps Bay to Logies Rock, $3\frac{1}{2}$ miles southwestward, is imperfectly surveyed, and there are no soundings off it. Vessels, therefore, should not approach it.

Oude Schip, a low rocky point of big bowlders, with a detached rock 25 feet high outside it, and several 6-foot rocks extending for $\frac{1}{2}$ mile off the point, is situated $1\frac{1}{2}$ miles south-southwestward of Logies Rock. Green Point Light bearing 43° leads $1\frac{1}{4}$ miles westward of these dangers.

Duyker Point is bold and rocky, forming the northwestern extremity of the Cape Peninsula. Breakers and rocks extend off it for 800 yards.

Vulcan Rock, the central and highest of a cluster, about 150 yards in extent, dries 3 feet at low water and is always visible by the sea breaking over it. It lies about 1 mile off the shore, and 1.6 miles 179° from Duyker Point.

Rocky Patch.—At the distance of $\frac{1}{2}$ mile southeastward from Vulcan Rock there is a rocky patch which breaks in heavy weather; a depth of 6 fathoms has been obtained on it, but there is possibly less water.

Duyker Island is a low flat rock, 12 feet high close to the shore, abreast Vulcan Rock; a line of breakers extends 600 yards south-southwestward from it. Vessels should pass outside Vulcan Rock.

Hout Bay, an indentation of 2,200 yards in extent to the north-northeastward in the high coastline, and is $2\frac{1}{2}$ miles southeastward

of Duyker Point. It affords anchorage in from 12 to 3 fathoms, sand, but is open to southwesterly winds.

The coast on either side of the entrance is high and rugged, particularly on the eastern shore, where the hills, rising precipitously from the coast, are broken by a succession of ravines. Hangberg Peak, a remarkable precipitous summit 1,080 feet high, overhangs the western side of the entrance.

York Point, on which are the remains of a battery in ruins, is a low point of boulders under Hangberg Peak. About 200 yards southwestward of the point a reef of boulders and rocks runs out for the distance of 200 yards; the point should be given a good berth on entering.

Landing.—Within the point there is good landing on a small sandy beach in all weathers; except in very fine weather this is the only landing place in the bay.

Blockhouse Point, on which there is a remarkable yellow patch with a ruined yellow chimney just above it, is on the opposite side of the bay.

The head of the bay is low and sandy, with a stream of running water. There are numerous fishing huts on the western side, but the township lies in the northeastern corner, where there is a post and telegraph office and two hotels. There are good roads from Hout Bay to Wynberg and Cape Town.

Anchorage.—The yellow patch on Blockhouse Point, or the yellow chimney, bearing 48° , leads directly into the bay. Hout Bay is open to southwesterly winds, but a small vessel can even then obtain good shelter in about $3\frac{1}{2}$ fathoms with the extremity of York Point touching Slang-kop Point, bearing 193° . The holding ground is excellent, being of soft sand.

During southeasters the squalls come down very heavily off the high lands in willi-waws, variable in direction, and stronger in force nearer to the eastern side of the bay. After some hours, as the southeaster freshens, the squalls reach over to York Point and in a bad southeaster are so violent that it is better for a vessel to proceed to sea rather than risk the danger of parting chain. After passing the mouth of Chapman Bay the wind will abate in violence and veer to the southward. A line of foam, giving a false appearance of danger, is frequently seen across the entrance.

Supplies.—Fresh water is abundant at Hout Bay, but there are no conveniences for getting it on board. Fresh meat may be obtained from Wynberg by the daily post cart; fish and other provisions can be got locally.

Tides.—It is high water, full and change, in Hout Bay at 2 h. 20 m.; springs rise 5 feet.

Chapman Point, which lies between Hout Bay and Chapman Bay, has a sunken reef, on which the sea always breaks, extending 600 yards from it, and immediately above it is Chapman Peak, of dark appearance, a bold sharp summit 1,980 feet high. From the westward it shows as a double summit of about equal height. From Chapman Point to Slang-kop Point the distance is about $3\frac{1}{2}$ miles in a south-southwesterly direction; the intervening shore falling back into the curved sandy beach forming Chapman Bay, which affords no safe anchorage in any winds.

Slang-kop Point itself is low and sandy, but immediately at the back the land rises steeply to a flat top 560 feet high.

Light.—It is the intention of the Lighthouse Department at Cape Town to establish a flashing white light visible 18 miles on Slang-kop Point.

Radio.—A radio station has been established on Slang-kop Point. It is open to the public at all hours. Call letters V N C.

A weather report containing meteorological data pertaining to the coasts of the Union of South Africa is sent out daily at 1 p. m., except Sunday, from the radio station on Slang-kop Point.

Radio time signals are sent out daily, preceded by the usual warning signal, and comprise a series of 12 dashes (each of about three-quarters second duration) extending over a half minute, divided into five groups, a dash being made at each of the following Greenwich mean times:

| h. | m. | s. | | h. | m. | s. | |
|----|----|----|-------------|----|----|----|-------------|
| 8 | 59 | 30 | } Group I. | 8 | 59 | 48 | } Group IV. |
| | | 32 | | | | 50 | |
| | | 34 | | 8 | 59 | 54 | |
| 8 | 59 | 38 | } Group II. | | | 56 | } Group V. |
| | | 40 | | | | 58 | |
| 8 | 59 | 44 | Group III. | 9 | 00 | 00 | |

Each signal may be used as indicating the exact Greenwich time recorded above; the beginning of the last dash of the series corresponding exactly with Greenwich mean time 9 h. 00 m. 00 s.

Sunken rocks, with patches of kelp, border the coast from Slang-kop Point to Olifants Bosch Point; 2 miles and 1 mile northward of Olifants Bosch Point they extend 1,000 and 800 yards offshore, respectively. With a swell from the westward the sea breaks heavily out to a distance of nearly 1 mile from the shore in probably from 5 to 10 fathoms.

Aspect.—Slang-kop Point may be recognized by the long strip of sand running along for 1 mile to the southward of the point, low down on the side of the hill. From the northward when the sand strip is shut in, the point shows as a long flat plateau. Southward

of Lions Head, with the exception of the sand patch under Little Lions Head, and a patch of sand on Rooikop over on the False Bay side, there is no other sand elevated above the shore until reaching Cape Maclear.

From Slang-kop point to Klaas-jagersberg River, a distance of 6 miles in a southerly direction, the coast becomes higher and rugged; thence to Olifants Bosch Point and the Cape of Good Hope it is elevated from 300 to 400 feet above the sea, and is tolerably regular in outline.

Albatross Rock is 400 yards in length, has less than 6 feet water, with 7 to 13 fathoms around, and 5 fathoms between it and Olifants Bosch Point. Its outer part lies with Olifants Bosch Point bearing 63° , distant 1,200 yards.

One mile westward of Albatross Rock the depths increase to 27 and 30 fathoms, and nearly the same depths are found at the distance of 2 miles in the same direction.

Leading mark.—In proceeding northward, keep the Cape Light, which is obscured by land when bearing 119° , in sight until Duyker Point is open of Slang-kop Point.

Blaauwberg Point.—Blaauwberg Point is situated $2\frac{1}{2}$ miles southward of Olifants Bosch Point. There is a rocky bank with a depth of 10 fathoms on it, over which the sea breaks in bad weather, situated $1\frac{1}{2}$ miles westward of Blaauwberg Point; in heavy southerly gales a continuous line of breakers has been observed to extend between this bank and the shore. Within the 20-fathom curve the soundings are most irregular in this locality. Vessels should be most careful to avoid passing within that line.

Cape of Good Hope.—The southern extremity of the Cape Peninsula is a high precipitous cliff, surmounted by two peaks distant from each other 1,500 yards in a west-northwest and east-southeast direction. The one to the northwestward, 880 feet high, is known as Vasco da Gama Peak; and on the other, 800 feet high, near the pitch of the cape, stands the lighthouse.

Light.—A revolving white light, elevated 816 feet and visible 36 miles, is exhibited from an iron tower, 30 feet high, painted white, erected near the summit of the cape. The light is obscured by the land from 125° to 119° , and over Simons Bay. For details see Light List.

Caution is necessary when approaching this light, as from its great elevation the light is frequently obscured by mist, although at the same time the atmosphere is clear round the horizon.

A Lloyd's signal station is established on Cape Point close to the lighthouse, which is connected with the telegraph system of Cape

Province; passing vessels showing their number will be duly reported.

Dangers off the cape.—Southwest reefs, which are generally breaking, appear to be the outer projections of a rocky ledge, extending one mile from Cape Maclear. The outer patches, of 5 fathoms, are situated 1.8 miles westward from the lighthouse. Under no circumstances should vessels attempt to pass inside these patches.

Bellows Rock, which is situated 2.2 miles 181° from the lighthouse, is awash at high water, and always breaks. The water is deep close round this rock except on its southwestern side, where there are sunken rocks about 200 yards distant, on which the sea does not always break.

Clearing marks.—Slang-kop Point open of Olifants Bosch Point, 340° , clears the above dangers to the westward.

Anvil Rock has a depth of 6 feet at low-water springs, and lies 1.7 miles 125° from the lighthouse, on the eastern end of a 3-fathom rocky patch, about 400 yards in length. It breaks only at low water with a heavy swell, and the depths to seaward are from 14 to 18 fathoms close-to.

Clearing marks.—Vasco da Gama Peak, open northward of the lighthouse hill, 299° , leads northward to Anvil Rock and Constantia Berg well in sight, 339° , leads eastward of it.

Dias Rock, about 8 feet high, is connected with Cape Point by a sunken reef. The water is deep at 400 yards seaward of the rock.

Three pinnacle rocks with $4\frac{1}{2}$ and 5 fathoms lie between Dias and Anvil Rocks, rendering the passage between them unavailable for vessels of large draft, or even for small vessels in bad weather.

Directions—Making the cape from the westward.—Vessels approaching the Cape of Good Hope from the westward may, if the weather be clear, make Cape Point Light at the distance of about 36 miles, except between the bearing of 125° and 119° (when it is hidden behind Vasco da Gama Peak). Caution is therefore necessary not to continue a course in a direction between these bearings when making the land at night or in hazy weather. Should a vessel be near the coast at night and the land not visible, she should be kept to the southwestward until her position is ascertained.

Sailing vessels.—As the wind seldom if ever blows from the eastward or northeastward (i. e., directly off the peninsula), sailing vessels bound either for Table Bay or around the Cape of Good Hope should insure a weatherly position to the northward or southward, according to the season of the year. Those for Simons Bay have been detained many days by southeasters off the Lions Head and Hout Bay, in consequence of their making the land too far to the north-

ward during the summer season. The same winds would have been fair for them had they been 30 miles farther southward. On the other hand, a vessel bound for Table Bay in the winter season will find it difficult to make her port from a position off Cape Point during the continuance of northerly and northwesterly winds, notwithstanding the general prevalence of a northwest current.

Rounding the cape from the westward.—Vessels rounding the cape from the westward and bound into False Bay, should pass about $\frac{1}{2}$ mile southward of Bellows Rock (which is always visible by the breakers), thence steer to the eastward until Constantia Berg is well in sight, bearing 339° , or Vasco da Gama Peak opens eastward of the lighthouse hill, either of which marks leads eastward of Anvil Rock.

Vessels proceeding to the eastward along the coast, having passed the cape at a prudent distance, should take careful bearings of the Cape of Good Hope Light as long as it is in sight and make every allowance for a possible easterly on-shore set in shaping course to pass Danger and Quoin Points.

Steamers bound into Simons Bay often pass inside the Bellows and Anvil Rocks, but the discovery of the pinnacle rocks before mentioned makes it advisable for large vessels to pass seaward of the Anvil. Vessels taking the inside route, when nearing Cape Maclear, must not bring Bellows Rock to bear southward of 113° until Dias Rock bears 55° , or until Cape Maclear is midway between Vasco da Gama Peak and a gap which separates the lighthouse from that peak, which will lead clear of Southwest Reefs, then steer to pass from 300 to 400 yards southward of Dias Rock. It must, however, be borne in mind that a $4\frac{1}{2}$ -fathom pinnacle rock is situated about 600 yards southeastward from Dias Rock, and that due allowance must be made for the scend of the sea.

Beaching.—There is a small sandy cove between the lighthouse and Cape Maclear, in which vessels in a sinking state may be beached in greater safety than on any other part of the adjacent seacoast.

Rounding the cape from the eastward.—When Cape Point Light is in sight, vessels standing in toward the land should be guided by frequent bearings. At the greatest range of the light its bearings will give an idea of the vessel's position with reference to Danger Point, which with the rocks off it should be carefully avoided, but when to the westward of Danger Point the light should not be brought to bear more westward than 290° , which will lead southward of all danger off Mudge Point and Cape Hangklip. As Cape Hangklip and the narrow neck of land which connects it to the shore is very low, great caution is necessary in passing it in hazy weather.

If bound for Table Bay from the eastward, vessels, after rounding the Cape of Good Hope and the coast northward to Slang-kop Point, at the distance of about 5 miles, should not shut in Cape Point Light with Slang-kop Point until Robben Island Light bears 23° , or the light on Green Point becomes visible, which will be on a 43° . This latter bearing leads about 3 miles northward of Vulcan Rock and $1\frac{1}{4}$ miles northward of the shoals extending from Oude Schip Rock.

The precaution of using the lead when approaching the Cape of Good Hope should never be omitted.

APPENDIX.

Great Britain—Caution when approaching ports.—The following has been received from the British Admiralty and is reproduced for the information of mariners:

CAUTION WHEN APPROACHING BRITISH PORTS.

PART I.—CLOSING OF PORTS.

(1) My Lords Commissioners of the Admiralty, having taken into consideration the fact that it may be necessary to forbid all entrance to certain ports of the Empire, hereby give notice that on approaching the shores of the United Kingdom, or any of the ports or localities of the British Empire, referred to in Part III of this notice, a sharp lookout should be kept for the signals described in the following paragraph, and for the vessels mentioned in paragraph (5), Part II, of this notice, and the distinguishing and other signals made by them. In the event of such signals being displayed, the port or locality should be approached with great caution, as it may be apprehended that obstructions may exist.

(2) If entrance to a port is prohibited, three red vertical lights by night, or three red vertical balls by day, will be exhibited in some conspicuous position in or near to its approach, which signals will also be shown by the vessels indicated in paragraph (5), Part II, of this notice.

If these signals are displayed, vessels must either proceed to the position marked "Examination anchorage" on the Admiralty charts and anchor there or keep the sea.

(3) At all the ports or localities, at home or abroad, referred to in Part III of this notice, searchlights are occasionally exhibited for exercise.

Instructions have been given to avoid directing movable searchlights during practice onto vessels under way, but mariners are warned that great care should be taken to keep a sharp lookout for the signals indicated in paragraph (2) above when searchlights are observed to be working.

PART II.—EXAMINATION SERVICE.

(4) In certain circumstances it is also necessary to take special measures to examine vessels desiring to enter the ports or localities, at home or abroad, referred to in Part III of this notice.

(5) In such case vessels carrying the distinguishing flags or lights mentioned in paragraph (7) will be charged with the duty of examining ships which desire to enter the ports and of allotting positions in which they shall anchor. If Government vessels or vessels belonging to the local port authority are found patrolling in the offing, merchant vessels are advised to communicate with such vessels with a view to obtaining information as to the course on

which they should approach the examination anchorage. Such communication will not be necessary in cases where the pilot on board has already received this information from the local authorities.

(6) As the institution of the examination service at any port will never be publicly advertised, especial care should be taken in approaching the ports, by day or night, to keep a sharp lookout for any vessel carrying the flags or lights mentioned in paragraph (7), and to be ready to "bring to" at once when hailed by her or warned by the firing of a gun or sound rocket.

In entering by night any of the ports mentioned in Part III serious delay and risk will be avoided if four efficient all-around lamps, two red and two white, are kept available for use.

(7) By day the distinguishing flags of the examination steamer will be a special flag (white and red horizontal surrounded by a blue border) and a blue ensign; also three red vertical balls if the port is closed.

By night the steamer will carry three red vertical lights if the port is closed and three white vertical lights if the port is open.

The above lights will be carried in addition to the ordinary navigational lights and will show an unbroken light around the horizon.

(8) Masters are warned that when approaching a British port where the examination service is in force they must have the distinguishing signal of their vessel ready to hoist immediately the examination steamer makes the signal.

(9) Masters are warned that before attempting to enter any of these ports when the examination service is in force they must, in their own interests, strictly obey all instructions given to them by the examination steamer. In the absence of any instructions from the examination steamer they must proceed to the position marked "Examination anchorage" on the Admiralty charts and anchor there or keep the sea.

While at anchor in the examination anchorage masters are warned that they must not lower any boats (except to avoid accident), communicate with the shore, work cables, move the ship, or allow anyone to leave the ship without permission from the examination steamer.

(10) In case of fog masters of vessels are enjoined to use the utmost care, and the examination anchorage itself should be approached with caution.

(11) Merchant vessels when approaching ports are specially cautioned against making use of private signals of any description, either by day or night; the use of them will render a vessel liable to be fired on.

(12) The pilots attached to the ports will be acquainted with the regulations to be followed.

PART III.—PORTS OR LOCALITIES REFERRED TO.

United Kingdom.—Alderney, Barrow, Barry, Belfast, Berehaven, Blyth, Clyde, Cromarty, Dover, Falmouth, Firth of Forth, Guernsey, Hartlepool, Harwich, Jersey Lough Swilly, Milford Haven, Newhaven, Plymouth, Portland, Portsmouth, Queenstown, River Humber, River Mersey, River Tay, River Tees, River Thames, River Tyne, Scapa Flow, Sheerness, Sunderland.

Canada.—Esquimalt, Halifax, Quebec.

Mediterranean.—Gibraltar, Malta.

Indian Ocean.—Aden, Bombay, Calcutta, Colombo, Karachi, Madras, Mauritius, Rangoon.

China Sea.—Hongkong, Singapore.

Africa.—Durban, Sierra Leone, Simons Bay, Table Bay.

Australia.—Adelaide, Brisbane, Fremantle, Melbourne, Newcastle, Sydney, Thursday Island.

Tasmania.—Hobart.

New Zealand.—Auckland, Otago, Port Lyttleton, Wellington.

West Indies.—Bermuda, Port Royal, Jamaica.

PART IV.—SWEEPING OPERATIONS.

His Majesty's vessels are constantly engaged in sweeping operations off ports in the United Kingdom.

While so engaged they work in pairs, connected by a wire hawser, and are consequently hampered to a very considerable extent in their maneuvering powers.

With a view to indicating the nature of the work on which these vessels are engaged, they show the following signals:

A black ball at the foremast head and a similar ball at the yardarm, or where it can best be seen, on that side on which it is dangerous for vessels to pass.

For the public safety all other vessels, whether steamers or sailing craft, must keep out of the way of vessels flying this signal and should especially remember that it is dangerous to pass between the vessels of a pair.

ADMISSION OF FOREIGN WAR VESSELS TO FRENCH TERRITORIAL WATERS AND PORTS IN TIME OF PEACE.

[Decree of 21st May, 1913.]

1. The term "war vessel" is herein considered to apply to all vessels designated as such in the accepted meaning of this term, as well as to auxiliary vessels of every description.

2. For the purposes of the present regulations—

(a) The French littoral is divided into sections, the limits of which are as follows:

Channel section: From the Belgian frontier to Primel Point.

Atlantic section: From Primel Point to the Spanish frontier.

Mediterranean section: From the Spanish frontier to the Italian frontier (including Corsica).

(b) Tunisia, Algeria, and the Moroccan protectorate form a single section.

These regulations also apply in all French colonies.

3. In peace time foreign war vessels are permanently authorized to visit French ports and those of protectorates, and to anchor in territorial waters, on condition that the number of such vessels flying the same flag does not exceed three per section.

In considering the number of vessels which can be admitted into a section at the same time, vessels already in that section will be taken into account.

The notification of a projected visit should, however, always be transmitted through the usual diplomatic channel so as to arrive, if circumstances permit, at least seven days before the date of the projected visit; and in the case of colonial ports, at least 30 days beforehand.

Foreign war vessels may not stay more than 15 days in ports and territorial waters. They will be required to put to sea in six hours if requested to do so by the naval authorities or by the "commandant d'armes," even if the prescribed term of stay has not expired.

4. A special authorization from the Government of the Republic, obtained through the usual diplomatic channel, is necessary both in order to prolong the duration of the visit and to exceed the number of vessels admitted specified in article 3.

5. The regulations given in articles 3 and 4 do not apply—

(a) To ships of war and vessels on board of which are embarked heads of States, members of reigning dynasties or their suites, or diplomatic representatives accredited to the Government of the Republic.

(b) To war vessels compelled to put into port by reason of damage sustained, bad weather, or other unforeseen causes.

(c) To vessels engaged in the superintendence of fisheries, in accordance with the conventions relating to these fisheries.

6. In ports which are chief naval ports of arrondissements or the headquarters of a senior naval officer, the right of assigning anchorage berths to foreign war vessels or of directing them to shift berth, if necessary, is vested solely in the *prefet maritime* or senior naval officer (*commandant de la marine*).

At all other ports this right is vested in the captain of the port.

7. Upon entering a port, foreign war vessels will be boarded by a naval officer, sent by the *prefet maritime* or senior naval officer, or by a port official sent by the captain of the port, who will offer the commanding officer the courtesy of the port.

The officer will acquaint the commanding officer with the anchoring berth that has been allotted to his ship and will obtain information as to the object and proposed duration of the visit, the name of the commanding officer, and the information it is usual to obtain upon such occasions.

Should the officer sent to welcome the foreign war vessel arrive on board after she has already anchored or made fast, the prescribed communication and inquiry will nevertheless be made and the confirmation of the anchoring berth taken or the assignation of another will also be carried out.

At anchorages where there is no captain of the port, if no French war vessel is present, the foreign war vessel will be boarded by a customs official.

8. Foreign war vessels calling at a port or in territorial waters are required to respect the fiscal laws and the laws and regulations regarding sanitation.

They are also required to adhere to all port regulations to which vessels of the French Navy are subject.

With this object, the local naval authority will furnish the commanding officer with all necessary information concerning the port regulations.

Foreign war vessels within territorial waters are forbidden to take bearings of the land or soundings, or to carry out, without permission, landing or firing exercises.

No submarine work, executed with or without divers, is to be undertaken without previous notice to the naval authorities.

Men belonging to ships' companies and troops must be unarmed when landed. Officers and petty officers (or N. C. O.'s) may carry the side arms which form part of their uniform.

The number of liberty men to be landed, the time of landing and return on board will be fixed by arrangement with the local civil authorities and the *commandant d'armes*.

Boats moving in ports and territorial waters may not be armed.

The death sentence may not be carried out by any foreign war vessel in territorial waters.

If a funeral is to take place on shore and the commanding officer desires an armed party to accompany the procession, he must obtain the permission of the *commandant d'armes*.

9. The regulations for the admission of belligerent foreign war vessels are set forth in the decree of the 18th October, 1912, but remain subject to the formalities of notification or previous authorization specified in articles 3 and 4 of the present decree, except in cases of force majeure provided for in paragraph (b) of article 5.

10. Should a foreign war vessel fail to comply with the regulations set forth in this decree, the local naval or military authority will first call the attention of her commanding officer to the infringement committed and formally request him to observe the regulations.

Should this course fail, the qualified authority, *prefet maritime*, senior naval officer, or commandant d'armes, may request the foreign war vessel to leave the port or territorial waters immediately.

REGULATIONS FOR APPROACHING FRENCH TERRITORIAL WATERS IN TIME OF WAR.

[Decree dated 26th May, 1913, modifying decree of 19th July, 1909.]

1. In time of war, the visits of ships, other than French war vessels, to anchorages and ports on the French littoral or in French protectorates, are governed by the regulations given below.

2. No French merchant vessel, nor foreign vessel, either war or merchant, may approach within 3 miles of the coast in French territorial waters or of French protectorates without permission without running the risk of being destroyed.

3. Between sunrise and sunset, every vessel affected by the present decree is to fly her national flag and number by International Code (if she has one) as soon as she approaches the forbidden zone. If desirous of entering the latter, a request is made by hoisting the pilot signal, the ship remaining outside the zone until authorized to enter by semaphore, the signal station, or examination vessel.

The reply from a semaphore, or signal station, is made in the International Code by the following signs:

S. flag: Entry permitted.

D. pendant: Entry deferred.

Q. flag: Entry forbidden.

If permission to enter is given, a ship is to steam at reduced speed in the forbidden zone, keeping the signal for a pilot flying.

If entry is deferred, a ship is to maneuver so as to clear the entrance to the channels and await the examination vessel, steaming toward the latter at reduced speed when seen.

If entry is forbidden, a ship is to abandon the idea of entering and make for another anchorage.

The examination vessel is distinguished by three balls on the same halyard.

4. Between sunset and sunrise every vessel affected by the present decree is to fly her national flag and have navigation lights lit on approaching the forbidden zone. If desirous of entering the latter, a request is made by burning one or more bengal lights and blowing blasts on the whistle or siren, the ship remaining outside the zone until permission to enter has been granted by an examination vessel.

The ship, with her navigation lights showing, will await the examination vessel and continue to burn bengal lights to attract attention, and, if not warned, on sighting the examination vessel, may steam toward her at reduced speed.

The examination vessel is distinguished by three red lights superimposed.

A red Coston light exhibited from a station on shore signifies that entry is forbidden; a ship must then give up the idea of entering and make for another anchorage.

Between sunset and sunrise every vessel affected by the present decree is in principle forbidden to request entry into the zones off the naval bases of operations—Cherbourg, Brest, Toulon, Bizerta—the only cases in which captains can request permission to enter are the following:

Vessels authorized to do so by the governor, either on their departure or while en route.

Vessels in danger, and absolutely incapable of remaining at sea until day-break, or of reaching another anchorage.

5. In foggy weather every vessel affected by the present decree desirous of entering the forbidden zone, is to hoist the same signals as in clear weather and blow blasts on the whistles or siren until permission to enter has been given by an examination vessel.

Entry into the naval bases of operations—Cherbourg, Brest, Toulon, Bizerta—is forbidden in foggy weather under the conditions specified in article 4.

6. Every vessel affected by the present decree must immediately comply with the orders of a war vessel or examination vessel, semaphore, or signal station, given by voice, international signal code, or by warning gun.

Every ship warned by a battery or war vessel, whatever her distance from shore may be, is to immediately stop. When stopped, a ship may renew her request to enter, but must await where she is orders which will be notified.

If in spite of the warning given by the firing of a blank charge a ship does not stop at once, a premonitory shot will be fired two minutes later, and if after the expiration of a further two minutes' interval the vessel is still under weigh, effective fire will be opened upon her.

In cases of emergency the blank charge may be omitted.

At night the warning gun may also be omitted, and every ship entering the forbidden zone without permission is liable to be destroyed without preliminary warning.

7. Vessels authorized to enter the roadsteads and ports of France and her protectorates are to take up the berths indicated by the local authority, and conform strictly to the regulations of every nature issued by that authority.

The length of stay of a ship will depend on military consideration, and when circumstances require it a ship may be ordered to put to sea or to move to a determined point; such order must be carried out without delay, though respite may be allowed to ships really unable to conform to it immediately.

No vessel is to get under weigh, either to change berth or to quit the roads, without the permission of the local authority; a request may be made by signal, S. flag.

8. In naval roads and ports, between sunset and sunrise, the movement of boats, other than those of war vessels, is absolutely forbidden.

From sunrise to sunset movement is only allowed to boats which have received a special permit from the naval authorities and the means of making themselves recognizable.

Boats with permits should steer clear of war vessels if ordered to do so, and can not in any case go alongside the latter without their permission. The movement of these boats will moreover remain subject to local regulations, notably those relative to the prohibition to enter certain parts of the roadstead, and to go alongside at any other place than those expressly notified.

In commercial ports similar measures will be taken by the local authority to impose the restrictions judged necessary on the movement of boats, due consideration being given to the interests of commerce.

9. Visits by neutral war vessels are governed by the decree of May 21, 1913, so far as notification or previous authorization is concerned, the regulations for entry being governed by the present decree.

10. The measures provided for by the present decree are to come into force on mobilization or on special notice.

11. Any infraction of the present decree will lead to such repressive measures as circumstances admit of, in addition to the risks of destruction incurred.

12. Regulations contrary to the present decree are canceled.

13. The Minister of Marine is charged with the execution of the present decree.

Signed by the President (of France) on May 26, 1913.

Signals to be made by vessels approaching defended ports when inconvenienced by searchlights.—Any vessel approaching a defended port in the Union of South Africa or defended French ports, or vessels of war, when searchlights are being worked, and finding that they interfere with her safe navigation, may make use of the following signals, either singly or combined:

• (a) By flashing lamp, four short flashes followed by one long flash.

(b) By whistle, siren, or fog horn, four short blasts followed by one long blast.

Whenever possible, both flashing lamp signals and sound signals should be used.

On these signals being made, the searchlights will be worked so as to cause the least inconvenience, being either doused, raised, or their direction altered.

The signals should not be used without real necessity, as unless the vessel is actually in the rays of the searchlight it is impossible to know which searchlight is affected.

These signals are designed to assist mariners, and do not render the Government liable in any way.

German waters—Approach before or during hostilities.—The German Government has given notice that under certain circumstances, such as maneuvers, ordinary exercises, or for other causes, it may be necessary to prohibit free entrance into German harbors and river mouths by night.

To indicate that the entrance to a harbor is closed, or that obstructions exist therein, three red balls by day and three red lights by night, placed vertically one above the other, will be shown in a conspicuous position near the approach to the harbor.

Vessels must then approach the harbor with the greatest caution. At night it is advisable, when possible, to anchor until daybreak outside the prohibited area.

The same course should be pursued if searchlights are at work or signals given the meaning of which is not recognizable from the Sailing Directions or Light Lists.

All merchant vessels desirous then to enter or leave these privileged harbors must not enter or leave without a pilot, and must submit to examination if required.

The establishment of an examination service will not be notified publicly, but, so far as possible, the requisite reports and directions will be given to approaching vessels by patrol ships, which will also carry the above-mentioned signals, viz, three red balls by day and three red lights by night, and also, under certain circumstances, the pilot flag.

The examination commission (and pilots) are on board the patrol ships; it is in the real interests of masters of vessels to comply with all directions received from them.

Under all circumstances vessels are prohibited from passing the line of patrol ships without communicating with them.

On a gun being fired or signal made from a patrol ship all merchant vessels must stop immediately.

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